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THE CLAIMS OF SCIENCE UPON THE SCHOOLS.

IF Science should be taught in our Schools, we must be prepared to answer, "Why?" and then to answer, "What science?" Science itself is the knowledge of the relation between cause and effect. We discover this relation by observation, investigation, inference, till we arrive at *law*. The infant indicates this course as true to nature; for he observes the candle, he puts his finger in the flame, and he infers that it would be better for him not to do so again. We find the child at birth conscious only of pleasure and pain, and a true system of training would be so to rear it that its life should afford the greatest amount of happiness with the least admixture of pain. This implies such a wise development of mind and body that the good should be the only true pleasure, and evil should correspond to pain. We can, without difficulty, imagine a mind so well trained as readily to distinguish between good and evil, in their widest sense, and so habituated to act upon principle that to do willful wrong would be almost impossible, upon whom evil would find no soil to germinate. One trained, for example, for simplicity of argument, to a single virtue such as industry, would find it actually painful to be unemployed. The discipline which such minds have undergone is really scientific. It is the development of the power of rapidly discerning cause and effect, and being guided by the decision they arrive at. Natural science pre eminently develops this power. Let us take the very familiar example of a tooth, and draw the inferences from it. It possesses fangs, and is sharp pointed. It is a double tooth, a small one. The fangs lead us to infer a socket for them and a jaw, the jaw a skull and skeleton, and these a vertebral column, a nervous cord and brain. From the sharp point we infer that the animal does not grind its food, for which a flat rough surface is necessary, but tears it, and therefore feeds on flesh. A flesh-tearer necessarily has feet to correspond, it will therefore be armed with claws; and as the tooth is very sharp, we infer that the animal feeds on living prey, is wholly carniverous, and that its claws are proportionately sharp. Being a flesh feeder, we know much of its digestive organs, which are short compared with herbiverous animals. It is probably, therefore, the tooth of some small carniverous quadruped—most likely the tooth of the domestic cat; and if we have extracted the tooth beforehand from poor Tab, for the sake of our inferences, we can speak with still greater certainty upon this point. Again, the microscopic structure of a section of bone reveals to us long canals surrounded by concentric rings of *lacunæ*, and this structure varies so in different animals, that the microscopist can readily tell the animal by its microscopic structure. The power of inference based on previous knowledge was exemplified by Owen in the case of the Dinornis in a manner that made him a demi-god for the time. From the structure of a single bone, he determined it first to be that of a bird; and then built up the typical bird, a fossil giant, rivaling Sinbad's roc, his inferences being verified after a few months by the discovery of complete fossil remains. Who can deny the power and importance of the

mental training indicated in these examples? In the schoolroom, our object-lessons would exemplify such training, given by a teacher who understood his art, while the same lessons in the infant-school should be an invaluable preliminary to science-teaching. All the good to be obtained by object-teaching has not been realized in our schools yet. With them, as with rudimentary subjects, teachers too often have thought their office merely to cram down knowledge, neglectful of the discipline indicated here. Yet, intelligently pursued, these lessons would help children over the "wearisome bitterness of their learning," changing it indeed for an ever-increasing eagerness for knowledge which would count nothing a difficulty that helped to feed an inquiring mind.

In itself the pursuit of science is wholly good. The investigation into nature's laws is simply the search after truth. The student does not aim at confuting cherished doctrines; he aims at understanding truths established, and at discovering new truths. He pursues his steps till he arrives at a law, or till he sees clearly the separation between the knowable and the unknowable. Unlike the ancient philosophers, he neither theorizes nor dogmatizes, nor wastes his life and energies upon the last, but reverently acknowledges what is beyond man, and confines his researches to that which will bring beneficial results. It may be his duty to keep his mind in abeyance for years, or to leave the discovery of a law to which he has pointed his finger, as a legacy to another age. A truly scientific mind cannot be obstinate in opinion, and even a small amount of scientific training saves us from the errors of superstition. The habit of seeking truth is contrary to an ignorant belief in the unknowable. The man of science lives in an illumined sphere greatly enlarged beyond the sphere of the ignorant; he lives, as it were, in a larger world, and therefore may be said to live more. The dark limits of his world, and his conception of the infinite beyond, are also alike extended, and he reveres the unknown. The bounds of the ignorant man's little world are close upon him; the darkness beyond is a subject of blind credulity, blended with terror.

What is seen and what is not seen are continually opposed to each other. The apparent is false, while the real is hidden. This is true in every department of science. The uneducated mind lays hold of the apparent, satisfied at once, while the disciplined mind seeks deeper for principles, inferring nothing without sufficient grounds. The child imagines trees and posts to flit by him, and he himself to be still, while riding in a railway car, and will cry out that the land is moving away as the steamboat starts from the pier. All the world once believed that the sun moved round the earth. Backwoodsmen will tell you how fossils are made by the trickling of the water through the earth. Our language is full of like instances. We speak of inspiration of the breath as though our breathing in were done with an effort, the same as we talk of a suction pump; and how many are there who upon leaving school can explain the vital action of the diaphragm and the philosophy of breathing? Science rectifies this. The habit of investigation prevents us from accepting an assertion as a fact. If we hear that the thunder has soured the milk, we are not satisfied with the simple evidence that the milk is sour. If we have our pocket picked or window broken, and we are told it is good for trade, we doubt the truth of the assertion, and would choose our own way rather to benefit trade. Thus, too, our little birds that devour the voracious grub, and the pretty spotted lady-bird that preys upon the plant-louse, are warred against by the farmer, who sees only the biggest thing, and, for want of a little science, slaughters the friends who would save his crops of corn and beans. Prizes have been given in our country districts for the largest trophy of prowess over our sparrows, and in France the fields have been so cleared of the feathered tribes that, as we hear, importations are taking place, of English birds, in order to arrest the progress of a chronic blight. This takes place in a day when we could not be persuaded that Rebecca the Jewess changed herself into a swan, and flew round the castle three times, even though the shaft shot at her was produced in evidence.

The mental discipline upon which we lay so much stress is a law of nature for the development of mind. As the mind strengthens and grows, so it would be able to take more abundant exercise. Too often, however, it is dwarfed and cramped and confined by injudicious management. Parents themselves being ignorant, are vexed rather than delighted with the questioning propensities of their children. We met with an instance in a Broadway omnibus the other day. A child, with juvenile inquisitiveness about every strange thing that passed, exclaimed, "Father, father, what is that? "Mind your own business, boy," was the paternal reply. The boy soon forgot the rebuff, and plied his parent again with, "Look here, father, what is that?" "Mind your own business, I tell you," was all the information vouchsafed. This little passage was repeated numberless times in the course of a short ride, and afforded an excellent exemplification of non-scientific training.

Every one accustomed to meet with young men knows how they pine for mental power. Innumerable opportunities for the acquisition of rudimentary science are proffered them without satisfying their undefined craving after knowledge. They long for the right to hold an opinion of their own, and wonder if the time will ever come when they may do so.

What science should we recommend to them? Natural science? mathematical? moral? As far as the mental culture goes, it may be left to the taste of the student to decide what he should study. If he aims at joining in and enjoying intellectual conversation, he will find that nothing comes amiss, but that the more he knows, the more his opportunities of enjoyment increase. A taste for science also is a growing taste. While we may learn much about geology without a knowledge of allied sciences, the thorough geologist must be competent in natural philosophy, chemistry, botany, zoology, and physical geography. The sciences are interlinked and expansive, so that the physiologist or botanist is not merely such, but is able to take a sensible view of most things.

If, however, we must name the foremost sciences lemanding the study of the young, we cannot hesitate to mention the laws of health and the laws of wealth; physical and social economy. The first teaches him to know himself, the second to know others. The first tells him *why* he should keep his body in temperance, soberness, and chastity, as the Churchmen say; the second, *why* he should "labor truly to get his own living." We see around us the whole world engaged in one way or another in the great work of the production of the necessaries and comforts of life, to which we give the name of wealth. The stock of wealth depends upon the industry and skill of the producers; and its increase in future depends upon the increase of our producing powers, that is, of industry, skill, intelligence, and other high qualities. We also observe how this great work of production is divided among the laborers and necessitates interchange, and how proportionate to a high or low possession of the industrial virtues. So we find in individuals and in communities abundance or deficiency of wealth. The dependence of one upon another leads us to consider how much we have to trust one another, and the importance of integrity in all our dealings. Our obligations to our forefathers, and our desire for the prosperity of our children, lead us to the thought of parental duties. And thus, in a manner only hinted at here, yet a pure scientific induction, we reach the great moral laws upon which is founded the superstructure of society. In our country, where health and social affairs are becoming the great topics of conversation, to which even Petroleum interests and Wall-street speculations are secondary, no one needs fear an inability to take his proper place who has made himself master of the laws of both.

The scientific and the uninformed man together are illustrative of the old tale of "Eyes and no Eyes." The first sees *more* in everything he glances at, and everything affords him a larger measure of happiness, while the uninformed man lets things pass, often without seeing them at all. In the course of a life-time, what an amount of happiness—of life itself—is thus lost! To the man of science, truly there are "sermons in stones," and every leaf and flower discourses wisdom.

Imagine a visit to Trenton Falls by a naturalist and a frivolous man, and measure the impression upon each. Accompany them to the Adirondac solitudes, and is it not with pity akin to pain, we see the botanical wonders there waste their glories upon one who might have been taught to understand them? But where does not the scientific man take the vantage? Inland or at the sea-shore, at home or abroad, he has in him a source of happiness, and a means of giving happiness. A sea anemone, or sea cucumber, has associated around it not only a personal history, but all the curious difficulties meeting us in low organisms, of drawing the line between animals and plants.

Nothing, perhaps, more distinguishes the scientific mind from the uninformed, even from the passing intelligent, than the readiness to explain problems, difficult from their very ease. Whales keep under water longer than the lungs of a mammal which they possess can account for. How is it? The zoologist knows at once of the strangely twisted arteries, which supply a reservoir of oxygenated blood ready for service in the circulation. What is the difference between horns and antlers, and what analogy have either with leaves? Why does a dead oyster gape? What are the differences between white and red coral? What is the luminosity of the sea owing to? What is the natural history of sponge, the leech, hydra, aphis or plant-louse? What is meant by "species?" What is meant by the term "alternation of generations?" These are all common things—so common, that on their recital most people would fancy they knew them. Yet how many have heard, indeed talked of and criticized a book like Darwin's without understanding it, perhaps without reading it! How many have seen their geraniums and roses destroyed by the aphis, who, if they knew its wonderful career, from the egg in the spring, and budding from its parents' sides, without sex, during summer, the last buds, as cold approaches in autumn, forming true sexes, and laying eggs for the next year's progeny, but would have felt a zoological compensation for their horticultural loss?

In conclusion, the taste for science, especially natural science, is a healthy sign; it is spreading. Mineral specimens, wardian cases, and the aquarium, are growing common. We should foster these tendencies, as a combination of physical and intellectual pursuits, and realizing pre-eminently the trite desire, a sound mind in a sound body.

THE USE OF GRAPHICS IN EDUCATION.

BY Graphics we here mean Drawing. And the application of drawing, both to the work of acquiring and imparting knowledge is what we mean by the use of graphics in education. As an instrument of knowledge, sight is undoubtedly the most nearly perfect of the senses. Through it we probably acquire more than through any other sense, if not more than through all the others. What we hear, we may soon forget. But *seeing*, truly, *is believing*. The *scenes* through which we pass are seldom obliterated from the memory; but we retain comparatively little of what we merely hear, especially in the earlier periods of life.

And there is also a great advantage in using the language of form, in connection with all subjects to which it is applicable, over that of words alone. This advantage is nearly or quite as great as that of seeing over hearing. A single drawing, even when hastily and roughly executed, will frequently convey a clearer conception of an object than whole pages of verbal description, and the drawing may perhaps be executed in a moment of time.

Suppose, for an example, that the object to be explained is a simple machine or structure of any kind; or suppose it to be the physical features of a country. A few dashes of the crayon or the pencil, in the hands of one who is apt in the practice, will convey to the pupil more accurate

ideas of the facts, than hours spent in explaining, or even days devoted to conning the pages of a book.

We believe we are speaking fully within bounds in this matter. We are speaking from experience as well as from a somewhat extended observation, and we feel that we are doing teachers a service when we earnestly commend these hints to their attention. We are convinced that the art of representing objects and conceptions through the language of form—nature's universal language—does not receive a tithe of the attention in our schools which its great utility and importance demand.

Not only as a means of communicating but also of acquiring and fixing knowledge in the mind of the pupil, would we strongly commend it to the attention of educators. The shortest and best method of learning all about a steam-engine, or a water-wheel, or a printing-press, next to examining the objects themselves, is, to delineate them, until every part is familiar. The sciences of physics, botany, geology, geography, and, in fact, all those branches which have to do with the natural world, might be taught and acquired with vastly greater facility and thoroughness, if, in connection with them, teacher and pupil alike made a free use of the art of delineation. Even language may be taught much more efficiently by the liberal use of the graphical art. A student in anatomy and physiology ought not to consider himself a master of his subject, until he can, with ease and grace, represent any portion of the structure with which he is called upon to deal. A student in geography is but an indifferent geographer, unless, with crayon in hand, he can readily sketch any outline of the earth's surface which is the object of study. In this manner, drawing ought to become one of the ruling methods alike of learning on the part of the pupil, and of teaching on the part of the instructor. There may be less words and more forms used with great benefit to the learner, and with far greater satisfaction to the teacher, if he will apply himself to the work.

Drawing, not only *per se*, but as an aid to study and discipline, ought to be a constant accompaniment to the exercises of a student Children should be practiced in drawing, as soon as they are old enough and strong enough to hold a pen or pencil. They ought to be encouraged to embody their conceptions in visible forms, as well as to express them in words. We believe in the doctrine, that "whoever can learn to write can learn to draw," and that there is no danger of carrying this practice to an extreme. For it is not only a great aid to study and instruction, but it has practical utilitarian tendencies—the value of which cannot be overestimated, even leaving out of the account its influence in the cultivation of the taste.

OBJECT-TEACHING.

LANGUAGES.

II.

WE have shown that Object-Teaching, or the analytico-synthetical method of instruction, can be advantageously employed when one or two foreign languages are taught with the mother tongue. We may now consider the use which can be made of this method, when applied to the mother tongue only.

It is in the study of grammar that the mother tongue becomes an *object* to our mind, and is analyzed into a great number of facts, from which the laws underlying them are, by observation and comparison, evolved; and to which again these laws, reduced to a logical system, are applied, in the shape of practical rules aiming at a correct and logical use of the language. By such a study of the mother tongue, the pupil is trained to use the latter consciously, no longer instinctively; logically, in-

stead of mechanically. But grammar can not effect this, if not of the right kind. And here it must be stated, that the grammatical text-books now in use in American schools are of little avail, and the study of grammar now carried on in most of our schools is not commensurate with the importance of the subject, nor comparable with that of any other branch of popular education.

The principal shortcomings in these text-books consist in their departing from the old Latin grammar, and in their neglecting the results of modern comparative grammar. It is wrong to style nouns, verbs, adjectives, adverbs, etc., *parts of speech*—they are *kinds of words*. Subject, predicate, and the several kinds of objects, are the real "Parts of Speech." It is faulty to describe *you* as of the second person singular, instead of *thou; you* is never any thing but the second person in the plural. It is unmitigated nonsense to speak of a *Potential Mood* in the English language, beside the Subjunctive Mood, when there is no such mood in it. It is not true that English has only three cases: the Nominative, the Possessive, and the *Objective;* there are certainly two Objective cases—a *Dative*, or a case for the so-called Personal object, and an *Accusative* for the Passive object. It is still worse to call *father's*, *mother's*, etc., the *Possessive case*, and to call *of the father*, *of the mother*, otherwise; it would be a better name to call both the *Genitive case*. What they are pleased to term the *Independent Nominative* is, and ought to be, the *Vocative case*. It is wrong to style *my* and *mine*, *thy* and *thine*, etc, the *Possessive case of the Personal Pronouns*, when they are not so, being in fact adjectives derived from the personal pronouns. *My*, *thy*, *our*, *your*, *their*, are, perhaps, best called *Possessive Adjectives; mine*, *thine*, *ours*, *yours*, *theirs*, are *Possessive Pronouns*. It is incorrect to class the *Perfect Tense* with the *Past Tenses;* it is a *Completed Present* or *Second Present*, and bears the same relation to the First Present as the Pluperfect or Second Past bears to the Imperfect or First Past, and as the Second Future bears to the First. And thus we could go on, enumerating blunders committed in the English grammars now in use. They all owe their origin to the idea that English ought to have a peculiar kind of grammar, instead of the universal or general one, and to a great deficiency of their authors in comparative grammar. If one of your pupils, after having acquired this kind of English grammar, wishes to learn foreign languages, he will have first to unlearn a great portion of the English grammar before he can understand that of other languages; the study of the latter will be much more difficult to him than it ought to be. But, worse than that, it is impossible to master the mother tongue itself according to such a grammar. If you succeed, you do so *in spite of*, not *by means of* your grammar; by your own correct instincts, not by its incorrect rules. If you conjugate, correctly, the Future of *I love*, as follows: *I shall love*, *thou wilt love*, *he will love*, *we shall love*, *you will love*, *they will love;* and the *Conditional: I should*, *thou wouldst*, *he would*, *we should*, *you would*, *they would love;* and if you, in your practice, distinguish well between these *auxiliary verbs*, and the verbs *I shall*, *thou shalt*, *he shall*, *we shall*, *you shall*, *they shall*, which indicate duty, and *I will*, *thou wilt*, *he will*, *we will*, *you will*, *they will*, which express intention; if you do that, then you will speak correct Anglo-Saxon, and avoid numerous blunders of American every-day talk; but that, certainly, you have not learned from your school text-books.

Language is spoken logic. Grammar is a theory of applied and exemplified logic, if it is what it ought to be. Every language has one or several means of expressing every category of thought, and may be styled, in scholastic phraseology, a system of categories. Grammar is to exhibit this organism in its entirety; and comparative grammar teaches which of those means of expression are accidental or idiomatic, which are necessary or common to all languages. Therefore a teacher of the grammar of the mother tongue can never be successful, if he be not a student of comparative grammar.

But if he is well versed in this noble science, the grammatical instruction will, under his treatment, become attractive

and instructive; while it is, under the present system, repulsive, tedious, and of little utility. Take, for instance, a task in etymology, such as would be adapted to pupils of a middle class in a grammar-school. You make them compare the words *goodness*, *soundness*, *irksomeness*, *fullness*, etc., and make them find the two laws—first, that nouns ending in *ness* are derivates of adjectives only; second, that they are abstract nouns, denoting the quality as a thing, or a notion. You make them find other nouns ending in *ness*, and state that each of these examples confirms the two laws. The knowledge of these laws, which your pupils acquire in this way, will later be turned to good account.

You may here, or not—according to the present proficiency of your pupils—add that only words of Anglo-Saxon descent assume the termination *ness*, while those of other derivation do not, and that, therefore, the termination *ness* is a criterion of the origin of the words. You give them the adjectives *shy*, *clever*, *prosperous*, *harsh*, *jolly*, *strange*, *pure*, *wild*, and many more, and ask them which of these may assume the ending in *ness*, and are, therefore, Anglo-Saxon words, which can not, and are not. At last you tell them the very few exceptions to this rule, like *consciousness*, *soberness*, *sociableness*. Treated in this way, the etymological part of the grammar becomes highly interesting and instructive. Till a good compendium of English etymology shall have been written, every thinking teacher may find out for himself as many as possible of the laws of this branch of science, following one or several of the great dictionaries.

Take another example from books adopted in higher grammar classes: the division and *classification of sentences*. Discard entirely that useless distinction between *simple*, *compound*, and *complex sentences!* What is it good for? What rule can you make to depend upon it? How can you make it fruitful for the faculties of the mind? Rather state only *two* chief kinds of sentences: *principal* and *dependent*. Be sure that your pupils understand this distinction. Give them a great many sentences first, and ask at every one of them whether it can stand independently, or wants another one to hang on. Then you subdivide the principal sentences into three kinds only: *direct speech* (declarative or asserting sentences), *direct question*, and *direct command or wish*, giving them examples, and making them find the differences for themselves, stating the right names, when they have found the same. The next step will be to make your pupils find sentences of each kind, and convert them into the other two kinds. The third step will be to teach them the first three kinds of dependent sentences, *indirect speech*, *indirect question*, and *indirect command or wish*. You do this, again, by giving examples, and making them find the differences between *direct* and *indirect speech*, *direct* and *indirect question*, *direct* and *indirect command or wish*. Then you may state the correct names for them, and make the pupils find examples of each, and convert each of the six previous kinds of sentences into the five others. This is the time to direct their attention to the fact that a dependent sentence of *indirect* speech always presupposes a principal sentence with a notion of *saying*, or *thinking* in it; that one of indirect question refers to a notion of *asking* or *uncertainty;* that one of indirect command depends on a notion of *will* within the principal sentence. Lastly, you ask your pupils what *subordinating conjunctions* connect each of these kinds of dependent sentences with its governing principal sentence, and do not forget to state that the *interrogative pronouns* who, whom, whose, which, and the *interrogative adverbs* when, why, wherefore, whereby, etc., may have, beside their functions as pronouns and adverbs, the function of *subordinating conjunctions* in sentences of indirect question. Later, you may state that, if the subordinating conjunction is, for the sake of brevity and stress, omitted, a dependent sentence of *indirect* speech, question, or command is *seemingly* converted into one of *direct* speech, question, or command, and you may exemplify it.

You ought not to forget to impress your pupils with the fact that, in a principal sentence, the first person, the speaker, is the asserting, or questioning, or command-

ing person, while, in a dependent sentence of indirect speech, question, or command, a second or third person is represented by the speaker as the asserting, asking, or commanding person.

Besides the above three kinds of dependent sentences, you ought to state the following kinds: 4. Dependent Sentence of *Intention* (conjunction, in order that, so that, etc.); 5. Dependent Sentence of *Condition* (conjunction, if); 6. *Relative Sentence* (conjunction, one of the relative pronouns, who, that, which, or one of the relative adverbs, why, wherefore, whereas, etc.); 7. *Local Sentence* (a subdivision of the relative sentence—conjunction, where, whence, whither, in which place, etc.); 8. *Temporal Sentence* (also a kind of relative sentence—conjunction, when, as soon as, while, after, ere, before, till, etc.); 9. *Comparative Sentence* (also a kind of relative sentence—conjunction, as, than, the; for instance, so large *as he is;* larger *than he is; the larger he is* the better); 10. *Causal Sentence* (conjunction, because, as, since, etc.); 11. *Adversative Causal Sentence* (conjunction, although, how-so-ever); 12. *Resultant Sentence* (conjunction, *so* great *that it was dangerous);* 13. *Substantive Sentence,* or one that stands in the stead of a noun; for instance, *that you hate them* [your hate] makes them no worse in my view (a subjective sentence); *that* God is good nobody denies [the goodness of God] (an objective sentence); 14. *The Participial* (shortened dependent) *Sentence;* 15. *The Infinitival* (shortened dependent) *Sentence.*

"Analysing," in grammar schools, is of utility only when the pupils can distinguish the above kinds of sentences, and thereby obtain an insight into the entire construction, logic, and character of a language. Then, and only then, will the principal object of analysis have been obtained.

"HOE OUT YOUR ROW!"

One lazy day a farmer's boy
  Was hoeing out the corn,
And moodily had listened long
  To hear the dinner horn.
The welcome blast was heard at last,
  And down he dropped his hoe,
But the farmer shouted in his ear:
    "Hoe out your row! Oh
    "Hoe out your row!"

Although a "hard one" was the row,
  To use a farmer's phrase,
And the lad, as sailors have it,
  Beginning well "to haze."
"I can!" said he, and manfully
  He seized again his hoe,
And the farmer smiled to see the boy
    Hoe out his row. Oh
    Hoe out his row.

The lad the text remembered long,
  And proved the moral well,
That perseverance to the end,
  At last will surely tell.
Take courage, man! Resolve you can,
  And strike a vigorous blow;
In life's great field of varied toil
    Hoe out your row. Oh
    Hoe out your row.

TO teachers has fallen the hardest task "in life's great field of varied toil;" for who has the hardihood to assert that *any* task can be more difficult than that of teaching "other people's children"?

First among the difficulties and annoyances is that crying nuisance of meddlesome *Trustees.*

These trustees, they spit upon the floor, they keep their hats on in our presence, they talk bad grammar to us, while consternation sits upon the faces of our pupils who listen. These are some of their *minor* sins. Among the *major* the most insufferable is this: that they know, without any experience whatever, just how to do that which we, with years of experience, and perhaps some natural talent, have not yet learned how to do, viz., *to teach* and *to govern.*

See Mr. A, of the Board of Trustees in Hardscrabble, town of Notown, enter your recitation-room, where you have the third class in Arithmetic dragged at length by the hair of their heads, as it were, through *Denominate Numbers* and *Vulgar Fractions,* aghast at the black-board, confronted by a terrible sum in Simple Inter-

est! Mr. A has a clear head for accounts. He can compute interest so closely that he knows how much longer acoming is the interest on his investments during the long days of summer than during the short days of winter; and he is confident of his ability to teach *interest*. The children open their mouths and listen eagerly while he "explains" and "explains," until he has explained himself into a profuse perspiration; yet the more he explains, the more the indubitable evidences of profound *puzzlement* overspread their countenances. He lays down the chalk at length, plies for a while the pocket handkerchief, then takes his hat, and making his bow, says: "*That's* the way to teach interest, Miss Meek." If Mr. A had to *make his living* by teaching interest, I wonder how large a fortune he would acquire?

Mr. A departs, rather pluming himself upon having taught the teacher a thing or two about interest. He has a genuine regard for the welfare of the school, and for the teacher, and he is unconscious that his visit to the school has much increased the teacher's labor.

1. The children now think that Mr. A understands interest better than the teacher. A most mischievous "thought" that is. For they *ought* to think that the teacher understands arithmetic better than any one else in the world.

2. They are discouraged from attempting to learn interest—for even Mr. A himself could not make it plain to them.

3. The teacher, being vexed and dispirited, finds his class unmanageable.

There will, therefore, be a fearful list of delinquencies at three o'clock, and a fine series of wrangling complaints from the parents; an old-fashioned crying-spell by Miss Meek, when the day's trials are over; and a throbbing headache for school next morning.

On the whole, it seems as if it would have been better if Mr. A, being a trustee, had *minded his business*, and permitted the teacher to mind hers.

Mr. B, another member of "the Board," thinks he knows how to manage boys, and he is consumed with a desire to display his skill upon the refractory subjects at the school.

The shrewd young scamps permit themselves to be easily managed by a trustee, to the intense chagrin of the teacher, by whom they will *not* permit themselves to be easily managed. And so Mr. B is confirmed in the views he has felt impelled to express at the meetings of "the Board," —"Miss Meek seems to be a pretty good *teacher*, but she knows nothing about government. She can not get along with Mr. This-one's boy, and Mr. That-one's boy; but whenever *I* go to the school, I manage them without the slightest difficulty." Such is Mr. B's opinion. *We* know that it is the boys who manage Mr. B.

The storm and the sunshine are each inconvenient at times; and so are trustees. But if we would breathe a pure atmosphere, we must have storms; and we must endure the hot sunshine of midsummer, if we would enjoy the fruits of autumn. Once a month, or at most once a quarter, we are glad to endure trustees.

Nature has in all her works a system of compensation. You know we teach the children that the carbonic acid exhaled by the respiration of animals is greedily inhaled by the plants, while we, on the other hand, inhale the oxygen exhaled by the plants. Well, Providence, which works by natural means, has ordered that wherever there is a Mr. A or a Mr. B in a board, there shall also be a Mr. C, whose shrewd sense shall preserve the intercourse between his associates and the teachers upon a friendly footing, and whose imperturbable good humor shall act as a fly-wheel in absorbing without damage to the machine, the too great momentum which the vagaries of Mr. A or Mr. B will sometimes give it. Mr. C we shall cherish, not alone because his zeal is as great as that of Mr. A and Mr. B, but also because his zeal "is according to knowledge."

The annoyance next in importance to be noticed, is the humiliating sense of social inferiority too generally forced upon teachers in communities intelligent enough to have a social intercourse worthy of the name. To the numerous festivities, whether they originate in hospitality or in frivolity, the lawyer, the doctor, and the minister are sure to be invited; but

the teacher! "A very good sort of person, the teacher; but he can scarcely expect to be asked to-night." Why can he not? Is he less a professional man than the lawyer or the doctor? or are his services less important to the community than those of the minister? Not one whit. To teachers is committed the great responsibility of opening, through the mind, the directest avenue to the heart. No one can look unmoved upon that most glorious sight, the eager attentive eye of an artless child, who is drinking in your instructions with the avidity of the thirsty sand, and whose little heart, in accord with yours, lies expanded before you like the landscape covered with new-fallen snow. You may explore its limits, leaving the impress of your footsteps, not to disappear with the returning sun, but to remain, ineffaceably fixed, for time and for eternity.

To the tyros of our profession may we well surrender the daily drudgery of grammar, geography, arithmetic, and the whole catalogue. But let those of us who would control the issues of thought rise to that height where, as from a mountain upon an extended plain, we may look down and address ourselves to the grand task to which duty has called us; the task of raising the present generation of children to an appreciation of the privileges which the stupendous events of the present day are marching, with even furious strides, to prepare for them.

An interesting portion of our common country now lies invitingly open to our profession. The busy whirl of life will soon wind up the scattered threads of hatred, envy, and malice that now encumber the nation's path. Then shall dawn upon that blighted region the benign influence of education, and the world shall see how much more powerful to subdue the nations is that agent, gentle as the dew distills, than the thunders of war and the raging force of passion.

To be consistent with the genius of our profession, let our instructions descend, like the snow-flakes, gently, noiselessly, continuously; shunning violence, as the flakes yield to the eddying gust; but, nevertheless, persistently as the flakes under the influence of gravity upon the first calm reach their destined place. What force of nature is so resistless as the snow? How, with its accumulation of feathery weights, does it by imperceptible degrees overwhelm the face of the earth. Like charity, it hides with its white mantle every unsightly object, and transforms the rectilinear awkwardness of fences and houses into its own witchery of curves. So should our instructions descend upon the minds and characters of our pupils, retreating before the gusts of passion, but continuing, upon the first calm, to descend, descend, descend, until every defect of character is obliterated, and the great natural features of mind and conscience have been preserved only to contribute to the graceful perfection which culture and refinement bestow.

The annoyances of which we so often complain result almost wholly from our own fault. We fail to *hoe out our rows.* May not the teachers mould the character of their pupils into almost any form they will? The teachers, I say. Not the schoolmasters and schoolma'ams; but those worthy to bear the honorable title of "teacher." And if the community has grown up impertinent and contemptuous, these defects are surely a reflection upon the moral culture it has derived from its teachers.

We enter the field in the morning with high anticipations, looking complacently upon the promising crop vigorously shooting up, and determined that active exertion shall keep the rows straight and exclude every weed. We put off our coats; all obstacles are overborne by our energy, which supplies even the want of skill. But as noon approaches, our efforts slacken, we "listen for the dinner-horn." We begin to regard the salary rather than the work. Day after day we leave unfinished rows. The weeds grow apace. At last, with implement over the shoulder, and coat upon the arm, with weary steps, we quit the field. So that when at length the crop is gathered, the regularity and abundance of fruit in the finished rows mortify us, and condemn our inactivity, when with superior skill we have yet failed to secure the entire crop. The half-formed characters; the unbalanced

minds; the misdirected energies, and the misguided zeal—how they condemn us for not having "hoed out the rows!"

In every decade there arises some monstrous doctrine, which spreads among men of culture, until coming in contact with the strong common sense of the illiterate vulgar, it explodes, and its professors sink into contempt. Should not a large share of this contempt, in equity, be visited upon the teachers of these "learned fools?" The very intellectual vigor which has enabled them to make themselves notorious, proves how well the teacher has hoed a portion of his row. Why did he not "hoe out the row," and educate also the common sense?

An excited brain and palsied body is the prevalent result of our methods of instruction, whose perfect work, like that of the pyrotechnist, flashes up into a blaze of glory, and then expires! Let us return to our pristine models of Greece and Rome. Let the gymnasium again enter into our curriculum. Let us run, jump, swim, play ball, skate! Let us, instead of the shrunken shanks, lantern jaws, and solemn airs of the "schoolmaster," present to our pupils vigorous manhood, overcoming imperfections of body, as well as of mind and morals. We should not presume to teach lads from whom we have anything to learn of athletic sports.

To make money is the fool's talent; to *make character* is our business. Let us seize and adapt to our use every common-sense suggestion that bears upon our calling, and, strong in mind and strong in body, work with a will to "hoe out the row" assigned us.

NATIONAL EDUCATION.

THE education of a man, and also of mankind in general, is progressive. It is constantly advancing, both in individuals and nations. Ages leave to ages the results of their material and intellectual labors. Man may be said to exist in a state of constant progression; for the ability to improve upon instruction is the characteristic which distinguishes and pertains to him alone of all the animal creation. Arts may be lost and sciences neglected, the genius of man may as often appear to retrograde as to advance, yet the philosopher, who studies deeply the question of education, must admit that all such losses and neglects are more than counterbalanced by progress in other directions, more necessary to the development of the world's great design, which culminates in the triumphs of humanity. The gain once achieved can no more be lost, than the flower can return into its seed, or the tree shrink back into its root.

We present these statements, because there are those who have but an imperfect idea of the full import of the word "education;" a word which comprehends both the instruction of a child, and the development of a nation or a world. Few appreciate its entire meaning, even as regards childhood and youth. There are more lessons learned by boys and girls, outside the schoolhouse, than those appointed to be studied within. Every sense in every returning day is imbibing constant instruction. Every surrounding circumstance bears on the question of education.

The distinctions and political classifications of mankind in Europe are unjustifiably based on grounds which arise solely from their defective systems, or rather their neglect, of popular education. Familiarize man with what is beautiful and ennobling, and you will produce, as a general rule, beautiful and noble men. This, in a very inferior degree, is admitted and acted upon with regard to the lower animals; why halt in applying it, in its full bearing, to humanity?

It will be seen, from the foregoing remarks, that we are not of those who believe that the termination of the course of academical studies completes the period of education. In order to secure the con-

tinuity of the advantages of our form of government, it is absolutely necessary to advance upon this. Without at all seeking to enforce the dull routine of scholastic life, the people must be still further instructed. Botanical and zoological gardens must be established. Schools of science, art, and literature ought to be founded in all our large cities. A minister and board of education in Washington ought to be created. Paris and even London are before us in these matters. Yet the nations, of which they are the centres, can better afford to refuse, and some of their rulers, even now, advocate the policy of refusing, a full and generous education to the classes devoted to material labor.

As republicans, our political system is based upon the equal rights and duties of all our people, and the advance of all our citizens is a necessity of our continued existence, the very life, hope, and safety of our nation.

BRAINS—HOW TO GET THEM.

A "BROOKLYN Teacher," in a series of vigorous articles published in one of our daily papers, has exhibited the peculiar importance of liberal education to that class who, with the most worldly wealth, have the least talent, and the greatest dislike for study. In an article with the above caption, he undertakes to show that there is no necessity in such cases for failure. We give the gist of his arguments.

The fundamental truth upon which rests the possibility of success is, that the power of mind upon mind is unlimited. It needs only to be brought really to bear; and if a human mind is idle and uncultivated, it is because the influence which a superior intelligence is capable of exerting upon it has never been freely bestowed.

The distinction between minds in children is simply a difference in degree of susceptibility to intellectual influence. One mind will catch a suggestion from a teacher or a book, expand it and expand with it, retain it and develop it, as eagerly, naturally, and pleasurably as a good appetite takes to food. A boy with such a mind wants nothing but books and school to make a scholar. It matters little where you send him. Another seems impenetrable to an idea—an intellectual stoic, upon whom the clearest explanation makes no impression, and to whom mental exertion, being fruitless, is odious. You will send such to the best schools in vain

Yet they are not incapable of being slowly magnetized and excited to mental vitality by a superior mind. It is evident that the effort of the teacher must be fully proportioned to the degree of insensibility to be overcome, and that if so proportioned, as to vigor and persistence, it must succeed. I state no theory here which has not stood the test of severe experiment. Intellectu al friction — closer, more personal, more vigorous, and more persevering—can develop vitality where schools, books, and tasks have failed.

Let me not be misunderstood. Mere energy will not do the business. When we speak of friction for stimulating the *bodily* functions, we do not mean that of a blacksmith's rasp. We mean a friction which is at once energetic, electric, warm, and genial. The glow of vital action must be aroused. In like manner the intellect needs not only irritation, but stimulation and encouragement. All say, and say truly, that pupils should be encouraged. But none seem to think of any way to do this except the often inapplicable and pernicious mode of praise, which, if undeserved, will encourage indolence rather than effort. What shall we do where praise is impossible? I answer, What we should always do in preference to much praise—that is, to encourage the mind by seeing that it shall taste the joy of achieving *something* for itself. There is no mind but can do, or can be taught to do, something by itself—

something real and palpable toward achieving any proper task.

And here we come to one of the grandest causes of good-for-nothing pupils. They really do not see how to learn their lessons; or they never began to learn the *art* of mental application; and they have, of course, no one at leisure to spend hours in teaching them individually how to study, or in putting them through a steady and continuous mental movement until they learn to sustain it independently. They are as truly and helplessly stuck fast as our army once was in the Virginia mud. They pore over the book in vacuity and despair, and reproaches and punishments afford no remedy; or they are obstructed at every turn by some perplexity which no one is at leisure to remove effectually. The short routine answer, all the teacher of a school has time to give, does no good. They lack the invincible determination which only one boy in a hundred has, to digest the obscurities of the book-statement for themselves, and they settle down deeper from day to day in disgust and despair. What they need, in either case, is an effort from the teacher, fully proportioned to their deficiency, whatever it is, and bestowed without stint. They want an auxiliary will to keep them to the work until their own will is stronger, and effort has become habitual and natural. They want the method of a superior and disciplined intellect to guide them over and over again, from step to step, through plain, direct processes of reasoning, and systematic modes of examining and memorizing statements. With these aids they will soon be surprised and delighted to find themselves actually achieving intellectual processes which had been to them hopeless, monstrous, hobgoblin tasks, associated only with failure, humiliation, and punishment. Like our soldiers in Virginia (ante-Grant), having been chased so often, they will be enraptured to know for once how it feels to "chase." The grand secret of interesting children in any thing is to remove the stumbling-blocks, and then make them do their work, and do it well. Every one loves to do, whatever he can do, well, and no such thing is too small or uninteresting in itself to take a pleasure and a pride in. No matter how they hate it, I never failed to get the worst pupil interested at last, if I had long enough control and a tolerably liberal allowance of time to carry out the process.

It is clear to the reader that the machinery of "school" contains no provision adequate to our purpose. Separate personal drill, by the hour, and every day, from a teacher who allows himself no such word as "fail," is absolutely necessary for a large proportion of children, in the early stages of education, to prepare them for any benefit from their classes in school. The same invigorating drill, stimulating influence, and expert direction in study, are of proportional value (although not exactly a *sine qua non*) to the more talented young students. In short, it ought to be the first maxim of every parent who means to afford his children the best advantages for education, that the more liberally he can engross the services of the most competent teachers—cost what it may—the cheaper is the instruction purchased in the end.

The proverb, "No royal road to learning," is true in a sense not usually realized. In other words, there is no such thing as cheap education. It is always costly to "somebody." All that the pupil can not or will not earn alone must be earned with and through him by the teacher, and paid for by the parent—or done without, which is the more usual course.

In the second place, it will have occurred to the reader that the real difficulty is to get the special kind of instruction recommended. "First catch your hare." First find your tutor—the judicious and untiring disciplinarian, who knows how to guide, to prompt, to suggest, to stimulate, but not to supplant the exertions of his pupil, and lighten his own task, by indulgent assistance. It does indeed require, in addition to scholarship, a patience, a persistency, a versatile ingenuity, and above all a genuine enthusiasm for teaching rarely combined in one character. This difficulty I do not pretend to solve. I can only say that if I were in the place of the rich parents I would compass sea and land, regardless of expense, to engage, and as far as possible engross, the services of

such a preceptor. Not undervaluing the peculiar uses of school, I should combine the separate with the social modes of instruction, making the school and the private tutor reciprocal helps and stimulants. If a man of wealth has an important affair to be managed, in law, in medicine, or in architecture, he wants nothing short of the best services of the most efficient and competent experts, and thinks nothing dear in such a matter but cheapness and stint. But when the children, for whom chiefly he lives and labors, gains and saves, are to have their intellectual power and calibre and respectability, and even the intellectual rank of their posterity, meted out to them by schools and schoolmasters, it is wonderful how easily he can be satisfied, and how superfluous and unreasonable the expense of special professional services appears!

To sum up: First—Find a true teacher, not one without faults, but one whose faults are not those of laziness, rote, helplessness, or ungodliness; not too small nor too great a man for your purpose. Second—Engage all the time he can spare, engage it "for the war," pay for it well, and let him study and manage the mind of each child, as a lawyer studies and manages cases involving millions of dollars, or as you study and manage a great business enterprise, which is yet as nothing compared with the least of parental enterprises. Third—Put the time of your children at his disposal; make the preceptor and physician the final arbiters of their holidays and hours of recreation, and let them never hear of the possibility of leaving school—chafe as they may—until their education is, in all respects, thoroughly grounded. Fourth—If possible, connect all this with the recitations and emulations of a school where the best competitors in learning are collected, and exert yourself to get every promising student you can hear of into the same school, for the mutual influence of youth is to them the most potent in the world, whether for good or for evil.

THE UNFINISHED PROBLEMS OF THE UNIVERSE.*

III.

IS it possible to find a center about which the whole Stellar Universe may be revolving? Admitting that there is no central orb there, admitting that there is no grand, central, controlling body, can we find a common centre of gravity of the whole immense system? The time will come when this question will be answered in the affirmative. A long time may roll away before we shall gather all the data necessary to give the exact solution of this great problem. A solution has been commenced; it has been attempted by one of the most distinguished astronomers of Europe, the successor of Struve, at the great Observatory at Dorpat—Maedler—who has distinguished himself in the astronomy of the double stars, and who, by his computations, examinations, and investigations, has placed himself on a level with the most distinguished men of the age.

I speak thus highly of Maedler because his theory is not now adopted by the best minds of the world. They are scarcely willing to accept it as yet. This was true of the theory of Sir William Herschel, when he announced that there was a point toward which the solar system was sweeping in space, and he believed that he had found it. Years, scores of years rolled away before this was received, but it was a pioneer announcement—the announcement of a brave, bold, and daring mind, one that dared to speak, no matter whether the world listened or not; and now we see the result. Then this German astronomer, in the service of the Emperor of Russia, dared to put forth this grand con-

* By the late Prof. O. M. Mitchell, in "Pulpit and Rostrum," No. 3. Published by Schermerhorn, Bancroft & Co.

ception of his; whether it be sustained or not is a question which posterity has to resolve.

Let me give some of the train of reasoning adopted in attempting to fasten the point about which the whole Stellar Universe is revolving, our own sun among the number. First, then, the Herschels have revealed to us the figure of the great stellar stratum to which we belong. We know that the stars are condensed in a certain plane, which we call the Galactic Circle. They are more numerous there; they are nearer together there, and heavier, in some sense, when you come to take the mass within a given area, than you find in any other region. Now suppose this to be that plane. As we rise above it, toward the North, the stars grow fewer in number in a given space; they are more widely separated from each other, and the stratum is comparatively shallow in that direction, as it is down below, toward the South. We are now enabled to determine the position of our own sun in this stratum, and we find it comparatively central in its location, and that we are nearer to the South than the North. Now, if this be true, we may anticipate that the centre of gravity will lie toward the North. I have already announced that we have determined the direction of solar motion precisely. If we sweep a circle perpendicular to this plane round the whole heavens, somewhere in the region of this circle, we may hope to find the centre about which our own sun is revolving, and if we find this centre, it is the common centre of gravity of the entire scheme of stars.

Such was the nature of the research which first guided Maedler in his examinations. He began by looking at various large stars in the heavens. His approximate observations led him to the region of the constellation "Taurus." He first commenced by supposing that by possibility the brilliant star in the eye of the Bull—"Aldebaran"—might be the central sun, but a rigorous examination soon demonstrated that this could not be so. He then looked a little further toward the South, and there he beheld that mighty and beautiful cluster of stars which we call the Pleiades. Seven of them are visible to the naked eye; but when we turn the telescope upon this cluster, we find hundreds coming up to greet the vision of man, presenting one of the most beautiful and magnificent spectacles that is to be found in the whole heavens. Here is, then, a vast multitude of clustering worlds, and in the centre of this cluster a bright and brilliant star, named by astronomers Alcyone. Maedler thought this might possibly be the centre. To verify the truth of this hypothesis, he began by a critical examination of what is called the *proper motion* of all the stars composing this cluster—all of them that had been mapped down; fortunately, this particular cluster had engaged the attention of Bessel, with his great heliometer. Many years before, he had determined the places of some fifty or sixty with wonderful delicacy and precision, and by comparing Bessel's observations with those of other astronomers that preceded him, and of others that followed him, it became possible to ascertain the amount of proper motion belonging to each and every one of these stars. Now, when the proper motion is examined, it is found to be almost identical for every one of them. Here is a most remarkable fact. Suppose these stars not to be associated in any specific manner; suppose them to be grouped together by chance, if you please. Why should they, in consequence of the movement of our own sun through space, all of them appear to sweep away together? This is utterly and absolutely impossible in one sense, unless you suppose them all to be crowded and condensed together, so as to become, as it were, a solitary nobody.

It is just as if you were sweeping along the line of a railway, and should see far off in the distance a little cluster of trees. By comparing their places with some more remote object, they might all appear to move together toward you. But suppose this cluster of trees should be expanded, separated, severed, and swept out to greater distances; then, you perceive the motions would be all different. Fixing your eye upon a distant object, one of these trees would move with a certain velocity, and another with a different velocity, and another with a still different velocity. And so in sweeping out the tele-

scopic ray to this mighty cluster of stars in the Pleiades, they ought to appear to change; they ought to seem to sever, the one from the other, if it be only occasioned by the fact that they are located in a sort of line in this way, some near to us, some in the center, and some more remote. They do not thus exhibit themselves to the eye of man. Their proper motions are all the same.

Now, if Maedler adopted the idea or hypothesis that here was the center of gravity of the universe, he could then commence a train of reasoning to verify the hypothesis. If this is the center, then our own sun is sweeping around that center, and the stars on the hither side will appear to move in a certain direction; the stars beyond will appear to move in a certain other direction; the stars on the outside of the sun's mighty orbit in opposition to it will appear to move in a certain direction; and the stars that, so far as our own sun is concerned, happen to occupy that circle perpendicular to the line of the motion of the sun, will have a certain direction of motion.

Now, it had been shown, in a paper of extraordinary interest and very profound investigation, that a large number of the conditions required to make this hypothesis the true one are verified by the examinations of the telescope. I do not pretend to indorse the theory of Maedler with reference to his central sun. If I did indorse it, it would amount to nothing, for he needs no indorsement of mine. But it is one of the great "unfinished problems of the universe" which remains yet to be solved. Future generations are to take it up. Materials for its solution are to accumulate from generation to generation, and possibly from century to century. Nay, I know not but thousands of years will roll away before the slow movements of these orbs shall so accumulate as to give us the data whereby the resolution may be absolutely accomplished. But shall we fail to work because the end is far off? Had the old astronomer, who once stood upon the watch-tower in Babylon, and there marked the coming of the dreaded eclipse, said: "I care not for this; this is the business of posterity; let posterity take care of itself; I will make no record;" and had, in succeeding ages, the sentinel in the watch-tower of the skies said: "I will retire from my post; I have no concern with these matters, which can do me no good; it is nothing that I can do for the age in which I live"—where would we have been now? Shall we not do for those who are to follow us what has been done for us by our predecessors? Let us not shrink from the responsibility which comes down upon the age in which we live. The great and mighty problem of the universe has been given to the whole human family for its solution. Not by any clime, not by any age, not by any nation, not by any individual man or mind, however great or grand, has this wondrous solution been accomplished, but it is the problem of humanity; and it will last as long as humanity sha.. inhabit the globe on which we live and move.

OBJECT-LESSON ON GOLD.

PROPERTIES OF GOLD.

TEACHER. What have I here?

Class. A gold ring.

T. It is not the ring, but the substance of which it is made, that I want to speak of. What is it? What shall I write upon the blackboard?

C. Gold.

T. To which of the three natural kingdoms does gold belong?

C. To the mineral kingdom.

T. Tell me what properties or qualities you know gold possesses.

C. It is hard, yellow, smooth, shining, heavy, dry.

T. Can I bend it easily?

C. No; it is stiff.

T. If I let it fall, will it break?

C. No; it is hard.

T. Glass is hard, but it will break very easily; you must think again.

C. It is tough.

T. That is right; but instead of using the word tough, we say it is *tenacious*, which means exactly the same. Can you see through gold?

C. No; it is solid.

T. Right and wrong at once: you are right in saying "no," and right also in saying gold is solid, for that is one of its properties; but not right in saying we cannot see through it because it is solid: glass is solid; but surely we can see through it. Try again.

C. It is thick, dull—

T. Neither word will do, for we may use them both in describing a transparent substance. When we can not see through a substance we call it *opaque;* when we can see through it, we call it *transparent.* Is gold, then, opaque or transparent?

C. It is opaque.

T. If I should put a piece of gold into the fire, what would be the consequence?

C. It would melt.

T. The word which describes that properly is *fusible.* Gold does not lose, either in weight or value, by being melted; therefore it is called a *perfect* metal. The only other perfect metals are silver and platina. Now take this ring and look on the inside, and tell me what you notice.

C. It is stamped.

T. If gold will receive a stamp what property must it possess? You can't tell? Another word for stamp is impression; now try.

C. It is impressible.

T. Right. Gold can be beaten out into leaves or sheets so thin that they will hardly bear breathing upon; what word would you use to express this quality?

C. Tenacious.

T. No; if gold were not tenacious it could not be beaten out, certainly; but woolen cloth is tenacious, and you will all agree that it would be useless to try to hammer that to increase its size: the word we want is *malleable.* Gold is also *ductile*, or capable of being *drawn out* into wire finer than a human hair. The gold thread used by the Israelites and Egyptians in their fine embroidery, was the solid metal beaten out very fine, and then rounded; we now use a silken thread with a gold coating as a substitute. We will close the lesson for to-day at this point; to-morrow we will speak of the uses of gold; and how, and where it is found. You may read, from the blackboard, the properties of gold.

C. Gold is hard, yellow, smooth, shining, heavy, dry, stiff, tenacious, solid, opaque, fusible, perfect, impressible, malleable, and ductile.

USES OF GOLD.

T. The subject of our lesson to-day will be—what?

C. The uses of gold, and where it is found.

T. Name the properties of gold, and I will write them on the board. Now for its uses—what are they?

C. It is used for money—

T. Instead of the word money say coins.

C. For coins, watches, embroidery, rings, brooches—

T. Can you not use one word to express all such things as rings, brooches, pins, buttons, studs, and the like?

C. Is it jewelry?

T. You are right. Are there any other uses to which gold is applied?

C. It is used for picture frames—

T. I think not; or, if so, the instances will be very rare, and quite beyond persons possessing an ordinary degree of wealth.

C. I have it now, teacher; it is not for the frames, but to cover the frames, that gold is used.

T. You are right this time; can you tell what this overlaying other substances with gold is called? No? What would you say of the edges of this book?

C. They are gilt; and overlaying with gold is gilding.

T. Now you are using your thoughts well, and I am pleased. Besides what we have named, gold is used for goblets, vases, spoons, and such things. Now read from the blackboard the uses of gold.

C. Gold is used for coins, watches, embroidery, jewelry, gilding, and for various utensils, such as goblets and vases.

T. Where is gold found?

C. In California and Oregon.

T. Yes; it is found in most hot countries—California, New Mexico, Brazil, and the East Indies. Africa has always been famous for gold. Herodotus, the Greek historian, tells us that the King of Ethiopia brought to Cambyses all his prisoners bound with chains of gold. Gold is sometimes found in the sand and mud of rivers, particularly in Guinea in Africa, and from the rivers Senegal, Gambia, and Niger.

It is said that the chief source of the long-famous riches of King Crœsus was the golden sands of Pactolus, a river in Lydia, flowing into the archipelago.

The discovery of gold in Brazil was made by a party of soldiers who were sent there to quell an insurrection. They found the natives using gold for making fish-hooks and other common things; their curiosity was excited, and they asked questions about it, and were told that it came down from the mountains in the time of the periodical floods. This was enough to cause a diligent search to be made, and the quantity of grains found after the floods was so great as to appear almost fabulous.

The principal gold mines in Europe are those of Hungary and Saltsburg; Spain is also thought to be very rich in gold; but since the discovery of this country the mines have not been worked.

We will now review the whole lesson. What have we called gold?

C. A metal.

T. To which kingdom does it belong?

C. To the mineral kingdom.

T. What are the properties of gold?

C. It is hard, yellow, smooth, shining, heavy, dry, stiff, tenacious, solid, opaque, fusible, perfect, impressible, malleable, and ductile.

T. What is the meaning of tenacious?

C. Tough.

T. Why do you say gold is opaque?

C. Because we can not see through it.

T. What do you mean by fusible?

C. Capable of being melted by fire.

T. What do you mean by saying gold is a perfect metal?

C. That it does not lose anything in weight or value by being melted.

T. What do you mean by malleable?

C. Capable of being beaten out into sheets or leaves.

T. How thin can gold be beaten out?

C. So thin that the leaves will hardly bear breathing upon.

T. Upon what other property in gold does its malleability and ductility depend?

C. Upon its tenacity.

T. Name some of the uses to which gold is applied.

C. Gold is used for coins, watches, jewelry, embroidery, gilding, and for vases, goblets, spoons, etc.

T. From whence do we obtain gold?

C. From California; New Mexico; Brazil; East Indies; Guinea, Senegambia, and other parts of Africa, and from Hungary in Europe.

T. What king bound his prisoners with chains of gold?

C. The King of Ethiopia.

T. From whence is Crœsus said to have obtained his proverbial riches?

C. From Pactolus, a river in Lydia, said to have golden sands.

T. How, and by whom, was the discovery of gold in Brazil made?

C. By some soldiers who were sent there to quell an insurrection. They found gold used for such common purposes among the natives, that they questioned them as to where they got it, and found that there was a great quantity in the country.

T. Well; you have remembered very well indeed. In two weeks from to-day I shall ask for a composition upon gold, from each one of you. I hope I shall find that you retain the knowledge you have now obtained.

PRINCE NAPOLEON is now writing a history of the Buonaparte family, to which his speech at Ajaccio may be supposed to be a preface. The first volume is in press.

THE TIDES.

THAT "time and tide wait for no man," is true,—is more than true. The trite observation is a tautological truism. For, in many languages, *time* and *tide* are, radically, synonymous words.* On the sun and the moon time and tide alike depend. But the lunar orb is of little importance in our chronological calculations, and the solar sphere only slightly influences the tidal wave. It is the Man in the Moon, therefore, who fixes the high-water and low-water marks.

The natural tide varies from about two feet at the equator, to about sixty feet near the poles; but various causes, among the most important being the configuration of the land, modify the normal results of the ebb and flow. In some places the tide rises to the height of one hundred feet, as in certain bays and channels opening in the direction of the tide-wave, and causing the convergence of the water to a narrow head. The various ranges, also, afford anomalies. On the coast of Ireland are places at which the range does not exceed three feet, while on either side, at short distances, it is more than twelve feet. At Chepstow, in the British Channel, directly opposite the locality where these low tides occur, the difference between high water and low water is not less than sixty feet. The height of the tide depends to an appreciable degree on the condition of the atmosphere. A low barometer denotes a comparatively high tide; a high barometer, a low tide. Winds exert a strongly disturbing influence. During a hurricane in England, January, 1839, there was no tide at Gainsborough, on the Trent, a phenomenon never before observed; while at Saltmarsh, on the Ouse, the tide continued to ebb, till in many places the bed of the river was dry.

The velocity of the tide-wave may be inferred, on considering that, being determined by the moon's transit, if uninterrupted, it would necessarily make the circuit of the earth in about twenty-four hours. At the equator, the velocity would be about one thousand miles an hour. In some parts of the Atlantic it is not much less than seven hundred miles an hour, or nearly equal to the velocity of sound through the air.

That tides are caused by solar and lunar attraction was first taught in Newton's *Principia*. The manner in which the attractive force produces the phenomena in question was not comprehended. Newton's views were erroneous, but fifty years elapsed before they were so far modified as to receive any important correction. Since 1738, at which time the French Academy of Sciences proposed the subject of the tides as a prize question, it has engaged the attention of some of the most philosophic minds in Europe and in America. Yet on the moon's horns still hang many a dilemma, and even the most elaborate theories, based on the Newtonian views, are not entirely satisfactory to those who propound them.

The most plausible and beautiful improvements of the old explication, in one direction widely diverging from the former track of inquiry, have been made by Datus Kelly, whose originality of thought entitles his name to a more conspicuous place in philosophic annals than has been assigned it. To the common teachings of the schools, that the moon more strongly attracts the water than the solid portion of the earth, causing the surface of the ocean to rise above its ordinary level, and, as the moon moves from east to west, producing a current, or rather a swell in the ocean, running in the same direction, he objects, that, on this principle, the tide-wave in all latitudes should move from east to west, and be the highest in the greatest extent of deep, open water. Facts favor his objection. In the Southern hemisphere, where the water encircles the globe, the tides are not as high as in many other places. The Mediterranean Sea, stretching east and west more than two thousand miles, is destitute of tide at either limit, while at the bottom of the Venetian Gulf, the distance

* Anglo-Saxon, *tid* (*tihadh*), time. Low German, *tied*, time; *tide*, *tie*, tide. Dutch, *tijd*, time; *tye*, tij, tide; etc.

not one-third as great, there is a regular tide of three feet, in an opposite direction. A tide which sometimes exceeds twenty feet, is found in the Gulf of California and the Gulf of Panama, which can not be accounted for by former theories.

The solid parts of the earth are supposed to be, per cubic foot, about five and one-half times as heavy as water. Accepting the usual figures as to the diameter of the earth, and the distance of the moon, that portion of the earth nearest the moon must be attracted one thirtieth part more than the opposite portion. The matter composing the earth being elastic, it assumes a spheroidal form, the longitudinal direction being always in a direct line with the moon; as in the satellites of Jupiter, which are of ovate form, and have their greatest diameter in the direction of their primary.

Hence, the earth is a prolate as well as an oblate spheroid. Exposing every part of its equatorial circumference to the attraction of the moon once in every twenty-four hours, Mr. Kelly holds that it must change its elongated form at the rate of one thousand miles an hour, at the equator. The water, being less dense than the solid portion, is less influenced by the moon, so that its tendency is, he says, to recede *in every direction*. Consequently, this oval shape of the earth following the moon in its course, causes the strongly attracted *solid portion to slide*, or be drawn from under the water, in obedience to the superior attraction.

This is the most satisfactory theory which has been presented. It fully accounts for the Atlantic northerly and southerly tides, which flow from the equator toward the poles. It shows the cause of the tide in the Red Sea, the north and south tide in the Mediterranean, the height of the tides in the Gulf of California and the Gulf of Panama, and similar phenomena, which, by the half-accepted Newtonian theory and its received modifications, are altogether inexplicable.

The operations of nature, even in its least significant processes, will always be entitled to scientific investigation. The tidal phenomena have received no undeserved attention.

But it is a moral anomaly, that, in this practical age, the utilizing of the tide-power receives so little consideration. Tide-mills are not unknown; but they are so rarely seen, that they are, by most persons, regarded as objects of curiosity. Many a city does more mechanical labor, by steam-engines, than is accomplished by all the tide-mills on the continent. This mode of making the immense force available is only one of the innumerable applications of which it is susceptible. Taking into consideration the vast seaboard of North America, and the fact that in various parts sands extend to a great distance, sometimes as far as a hundred miles, covered by waters of less than a hundred fathoms depth, we need only to apply the accredited figures respecting the force of the tidal current, to be assured that the mighty agent which now impedes our yachts and ferry-boats, or serves occasionally to release the ships which it had fixed on a shoal, possesses, for every mile of the entire coast, an average power equal to a million ten-horse power engines!

CURIOUS ETHNOLOGICAL FACT.

IT is said that among all the varieties of figures which have been dug up from the Chiriqui graves, in New Granada, there is not one which resembles either a horse, cow, pig, dog, cat, or any other domestic animal, which is strong proof that they were made by a race who existed prior to the introduction of these animals into this continent. Some assert, however, that fossil remains prove the horse to have been indigenous here, and not of Eastern origin, as many suppose.

AMERICAN EDUCATIONAL MONTHLY.

AUGUST, 1865.

The Summer Vacation.

THE queens reign—Flora I., the flower girl; Flora II., the flimsy.

The summer-queen is fairly established in her reign. The verbenas and geraniums, at our dining-room windows, have survived the aphis and all the ills that botanical adolescence is heir to; the mignonette, in the parlor vases, is not less luxuriant than fragrant; a five-minutes glance at the Elysian Fields of Hoboken, and a half-hour's gaze from the bluff at Fort Lee, show the maturing grass of the meadows, and the herbage of hillside fields, hinting of the harvest, and prophetic of prosperity.

The fashion-queen, too, always firmly established, is ruling with unrestricted sway. Notwithstanding the interesting character of our national affairs, and the crisis again approaching in Europe, the present season will bring to the various places of summer resort as numerous an assemblage as ever collected at these points of attraction. The respective merits of Saratoga and Lake Superior, of Kelly's Island and the Catskill Mountains, of Newport seaweed and Cape May diamonds, are canvassed, discussed, and reconsidered with the enthusiasm of school excursionists, and the acumen of a cabinet meeting.

Choose ye, this day, whom ye will serve—Flora, the Flower Girl; or, Flora, the Flimsy. On one side, are fields and footpaths, quiet lanes and shady groves; on the other, piazzas and balustrades, billiard-rooms and hotel parlors. Here, you will see wealthy men and good-natured women, will dine with a good appetite, without injury to the digestive functions, and sleep in a spacious bedroom worthy of Momus. There, you will be with health-seeking merchants and crook-backed belles, and, surrounded by pickpockets and sharpers, will feed on condiments, and rest in sleeping cells. Choose whom ye will serve, or try to solve the problem, for which Holy Writ gives no solution, how to serve two masters, and, adopting an eclectic system of recreation, be fashionable and comfortable—if you can.

Few persons need recreation more than our teachers. True, in pedagogy, six hours make a day's work, theoretically, and five days a week. Unfortunately, it is found in practice, that anxious thought is not usually dismissed simultaneously with the scholars; the wear and tear of mental machinery continues, when the six hours have passed, and the five days' week is completed. Teachers need a summer vacation more than bad boys need a whipping. Custom sanctions it. The law provides for it; it might be said, pays for it. For in most of our public schools there is no suspension of the salary, no debit item in consequence of the two-months' rest. Let teachers avail themselves of the privilege, and begin their perambulations with a good heart. Others, in a hundred occupations, may literally "count the cost;" the teacher should feel that, in one sense, his railway fare, his hotel bill, and incidental expenses, are defrayed by the public.

A strictly fashionable pilgrimage is our detestation. But this need not be undertaken. The extent of American territory, the gradations and diversities of social life, and the plenitude of cousins, who are glad to greet us once a year—God bless them, and preserve them in the annoyances we cause them—afford to all, who are not over-fastidious, ample advantages and attractions.

We avow our allegiance to the true sum-

mer queen. We acknowledge a preference of natural objects, of rustic scenes; we believe that their influences upon teachers are especially beneficial, morally and physically. The general phenomena of nature, atmospheric influences, climatic changes, geological and mineralogical characteristics, the peculiarities and interdependence of natural objects—these are the basis on which social laws and the rules of art must be founded. To the teacher, therefore, even in his professional character, these are of paramount importance. Even the mysteries of vegetation, it has been truly said, has a higher significance than either the education of man's intellect, or the maintenance of animal life. With the influences of the vegetable world, man's heart—his moral nature—is in intimate communion, and through them nature is revealed in her most endearing attributes; by its teachings our moral nature is affected in no slight degree, and flowers are often interwoven with the web of human destiny.

Although much may thus be learned, which will qualify the teacher for his profession, let him not make his relaxation a labor. Many teachers work too hard—study too much. All mind and no body, would in some cases seem to be the pedagogic motto. But even after considering the allegations of the table-tippers, and studying the revelations of the most distinguished disembodied spirits, we are not able to perceive that the soul is of much account in this world without its corporeal compeer. The body is slandered by the theologians, and slighted by all metaphysicians. The teacher should not ignore its importance, nor disregard its claims.

Welcome, then, the summer vacation, in which both the mind and the body may have recreation, relaxation, and, more especially, repose, *rest*. The bow must not be always bent. The wheels of thought must not always revolve. Excess of oxygen burns up the blood. Too much excitement paralyzes the brain. Nature enjoins periodical rest, and in a thousand ways reminds us of its necessity. The active, exhilarating influences of spring are reversed by the more deliberate processes and calmer enjoyments of autumn; the matured powers of summer are succeeded by winter's torpor and repose. Sunlight stimulates the operations of nature; but the energies thus exercised can be sustained only by the repose which ensues, when the activity of day gives place to the stillness of night, and the countless exhalations from ocean, and lake, and stream, which had arisen as a morning incense, are succeeded by the noiseless gathering of dewdrops on closed flowers and quiet leaves.

Obstreperous Teachers.

THE derelictions of some of the New York teachers have recently been so flagrant as to attract public attention.

1. A communication from a school officer, to the Board of Education, states that a teacher in Grammar School No. 29 has been in the habit of appearing before his class in a state of intoxication; that at one time the class were thus for three weeks deprived of his services, and that, when urged to resign, the teacher utterly refused to vacate his position.

2. An instructress in the Oliver-street School has pleaded guilty, on the finding of a bill of indictment for a felonious assault and battery, committed on the person of another woman.

3. Charges have been preferred against a school trustee of the Nineteenth Ward—an affidavit showing that he has endeavored to defraud the wife and children of a deceased soldier, by retaining the bounty and back pay which he had been commissioned to collect.

4. An instructress in Primary School No. 10 has been charged with cruelly beating a little boy, and though a committee exonerated her, the resulting resolution, adopted by the Board of Education, and the remarks made pending its discussion, are very strongly condemnatory.

It has been reasonably urged that we are not to denounce a class, because individual members of that class prove unworthy of their position, and that the teachers of New York are not accountable, as a body, for the crimes of particular members of their profession. Yet it is a notable fact that a large number of the teachers employed in the public schools of the city are totally unfit for their places, either morally or intellectually. Because a person successfully passes examination, and receives a certificate of qualification to teach, it does not follow that he is therefore competent to lead the mind of youth. More discrimination is needed in the selection of teachers. Political and personal influence is allowed to weigh too heavily in the balance, and is apt to be taken into consideration in preference to moral and intellectual fitness. The standard of qualifications for teachers should be so high as to debar all applicants who are not in every respect competent. Any other public position may, with less fatal consequences, be filled by unworthy officials. Let city councils wrangle about the cleaning of the streets. Let Fourth-of-July committees change the corporation greenbacks into pyrotechnic blue-lights and rockets. But let us have integrity among teachers, and order in the schools.

Parents, it is truly said, do not appreciate the important trust which they delegate to the teacher, and are apt to overlook the fact that, in the schoolroom, more than in the family-circle, the child is moulded into the future man. There is a disposition to leave this important matter entirely with the teachers, and to depend on them for the full charge of education. If parents would make it a point to pay occasional visits to the schools, see for themselves what progress their children are making, and judge for themselves of the capabilities of teachers, much good might be accomplished. This course would not only satisfy parents regarding the condition of the schools, but would exercise a wholesome influence upon the teachers, cause them to be more mindful of their duties, and stimulate the children with an increased ardor in the prosecution of their studies. The influence thus brought to bear would tend to remove incompetent teachers, for no evil can long withstand the assaults of public opinion when rightly directed. It is certainly the duty of every parent to assure himself that his child is properly instructed. This knowledge can be acquired only by personal observation.

An English School-Project.

In England, various educational enterprises have recently been undertaken. One of these possesses some new features. The projector is endeavoring to establish a parochial system of teaching, designed to continue from the leaving of the day-school till the age of twenty-one is reached. He contends that, by a system of prizes, this object could be attained. His scheme has been commended by clergymen and influential educationists. All parishes are to furnish their own funds, which he proposes to raise by a weekly contribution of one penny from the different parishioners. It is believed that such a fund in every parish would admit of the liquidation of all expenses, including the payment of salaries to teachers, and prizes to the pupils. It is proposed to establish, in

the evening schools, singing-classes, sewing-classes, sick and burial classes, and a system of transferrence by which when a boy leaves one parish school, he will be transferred to another of a higher class.

EDITORIAL CORRESPONDENCE.

MY FIRST EXPERIENCE IN TEACHING.

LONG ISLAND, N. Y., July 20, 1865.

IT seems to be fashionable now-a-days to make a father-confessor of the MONTHLY. Accordingly I make my confession. Full of philosophic ideas, and philanthropic intentions, respecting refractory boys and illiterate girls, I arrived at the age of eighteen, when, hearing of a vacancy in a country district school, some ten miles from my home, I made application, and in due time received a letter, looking as if it had been written by Noah while sojourning in the ark; this thought, however, was immediately put to flight, by seeing the signature of "Josiah Jones, of Jonestown." It stated that all the arrangements were made for me to take the school the next week. Monday morning came, and with it a long, lean, lank, yellow-haired youth, with an old one-seated wagon, and an equally old gray horse. In this style I was conveyed to my new home; the wagon was, unfortunately, so small, that it would not admit of my trunk, so I was obliged to leave it behind, to come up in the "next train," which, in this instance, happened to be a load of potatoes.

I was not subjected to the horrors of "boarding around" (though a change *might* have been for the better), but was stationed at the house of Mr. Jeremiah Jones, in the centre of the town, it being only three-quarters of a mile from the schoolhouse, and much nearer to it than any other dwelling. I can readily understand why the place should be called *Jones*—for every one there bore that name; but why it should receive the title of *town* is really beyond my comprehension. In my three months' stay there I saw only three houses and the schoolhouse, but was informed by "good authority" that there was a blacksmith-shop some two and a half miles distant. The nearest post-office was five miles; we generally managed to get the news, after it had been known everywhere else some two or three weeks.

I had fancied the country schoolhouse a neat and comfortable wooden structure, painted red, of course, with a fire blazing cheerily in the huge stove, nicely painted desks and seats occupying the room, and on the neatly whitewashed wall a few good maps and charts. In imagination, it was surrounded by beautiful shade-trees, warding off the hot summer sun, as well as the cold winds and blasts of winter,—altogether, a delightful place in which to rusticate, and to train Young America in the way he should go.

Lo! the contrast of the real and the ideal. It was a bitter cold morning, the 15th of November, when I began my duties in this illustrious place. I think my feelings, when I saw how rudely my air-castles were tumbling down, came under that class which can "better be imagined than described." It looked more like a dilapidated barn than like my imaginary schoolhouse; the bare walls and ceiling were of boards, plaster was discarded, and both inside and outside paint and lime were ignored. The desks were of every imaginable size and shape, being literally covered with initials, names, and dates, cut in huge letters, by the schoolboy's ever-ready weapon, the jack-knife.

The small stove was a mere apology, scarcely deserving of the name; there was a broad crack in the side, through which issued little heat and much smoke.

An article in a recent number of the MONTHLY spoke of the improper manner in which schoolrooms are ventilated. In this case, the ventilation was the superlative of impropriety. There was too much ventilation. There were no less than eleven panes of glass wanting in the windows; the building had no underpinning, therefore huge cracks and knot-holes in the floor revealed the light. It was the delight of the children to lay paper over these, for the purpose of seeing to how great a height it would blow. Here and there a weather-board had blown off, so when it rained we were favored with a shower-bath, and when it snowed, like poor Mr. Williams at Mr. Flint's, we were actually "snowed under."

From this disheartening survey I turned to view the scholars. They were four in number. One boy was barefoot, and the other hatless; his hat, as he said, was put in a window at home "to keep the warm in." He insisted upon it that he was studying geography, although he was no further than N in the alphabet. The girls, also, were quite advanced; one was ciphering in short division, but had not the faintest idea what

numeration or addition meant. The other did not know the alphabet, and I very much doubt that she ever will. As days passed my school increased. There were some large boys of sixteen or seventeen years of age, who did not know what the multiplication-table was, but supposed it a peculiar kind of wood, greatly inferior to their pine tables. I did not discover that there was much genius lurking in that quarter, and, despairing of ever sending a president or Congressman from Jonestown, I was not sorry when my term closed. The "ventilation" had given me a severe cold, which needed attention. Accordingly, on a cold morning, in the middle of February, I was taken to my paternal roof, by the gray horse and the youth with yellow locks.

I did not forsake the business after this campaign. Oh! no; I am still a teacher, though, I am happy to say, not in Jonestown. But the Jonestown school, it would seem, still serves as a model in various parts of the country. The facts which I observe prepare me to believe almost any account I hear. And I am glad to perceive that the science of the MONTHLY'S *Ventilator*, and the sarcasm of the "Old Schoolmaster," in his *Stray Chapters*, are directly or indirectly advancing the views with which I began my career, unconscious of the vastness of the field before me. M. L. G.

MUSIC IN THE NEW YORK PUBLIC SCHOOLS.

NEW YORK, July 2, 1865.

PROVISION is made whereby vocal music may be taught in our public schools, and most of them secure professors who make periodical visits at stated periods for the ostensible purpose of teaching the children to sing. Having visited many schools for the purpose of ascertaining the mode of instruction, I must declare, unequivocally, that the results are altogether unsatisfactory. Most of the teachers have been employed in these schools for many years, and are some of them undoubtedly persons of good character and personal worth. We do not think they would willingly injure voices, or retard the progress of their pupils; but, to speak plainly, they seem to have lost all interest and pride in their work, and have become mere automata who rush from school to school, and play on the piano a few commonplace melodies, which the children are expected to accompany with the utmost power of their lungs, without any regard to expression or sweetness of tone. The music, which consists in many cases of their own compositions, or, generally, compilations, and on which they realize a percentage, is generally of a very inferior order of merit, as these professors say that children are not capable of learning music of a high order. The fact is, as the musical taste of our youth is in a great measure *formed* by the music they are taught in the schools, none but the purest models should be presented. One hour a week properly employed would produce better results than are now obtained. The *boys* are not taught to *sing*. They are merely goaded on to yell at the utmost power of their voices, and to the peril of their vocal organs. It is almost impossible to find, among our public school pupils, boys whose voices have not been strained, and who are not losing their sweetness of tone by the careless manner in which they have been allowed to sing. If the whole school *must* attend the musical exercises, let the whole school learn notes; but boys whose voices are changed, or are changing, should not be compelled to join in the vocal exercises. Boys whose voices are changing, or have just changed, should *never* sing till their voices settle. If a boy sing soprano, he should not force his chest tones up the scale, as is too often done. Boys' throats are *not* human trumpets; a boy's voice is one of the sweetest of musical tones when properly developed.

I dwell particularly on the singing of our public schoolboys, as there is much that needs a thorough and radical reform in that direction. If a stranger visits one of our schools, to hear the singing, he is generally informed that the *best* singing is to be heard in the female departments. "The boys are all very well to 'fill up,' in the choruses, or to come in on the whistling echoes; but as for teaching them good music, or showing them how to sing it, it is not considered important, as the girls 'take to' singing so naturally, and then their voices are so much softer than the boys, that of course it is less trouble to teach them; and then boys are *so* noisy, that, positively, it is a terrible task to teach singing in the boys' department at all. But as one depends upon it for a living, why one must put up with such inconveniences 'you know.'" I firmly believe, that, were a proper system of teaching boys vocal music once adopted in our schools, and were the same interest, and, I might say, *intelligence*, manifested in this subject as is displayed in the other branches of instruction, the singing in our male departments would equal, if not excel, in sweetness that of the female departments. We hope that our schools will investigate this subject thoroughly, and endeavor to effect a radical reform. F. G.

A CHILD'S faith in his teacher is well illustrated by the following incident: "A little boy, disputing with his sister on some subject, exclaimed, 'It is true, for teacher says so; and if she says so, it is so, if it an't so.'"

EDUCATIONAL INTELLIGENCE.

NEW YORK.—The State Teachers' Association held their Twentieth Annual Meeting, July 25, 26, 27. Appointments had been duly made to secure the following reports, etc.:

Reports of Standing and Special Committees.

I. "The Condition of Education." James Cruikshank, LL.D., Chairman.

II. Teachers' "Institutes, and the best Method of Conducting Them." S. G. Williams, Ithaca, Chairman.

III. "Classification in Physiology." Dr. T. S. Lambert, Peekskill, Chairman.

IV. "Improved Methods in Education." E. A. Sheldon, Oswego, Chairman.

V. "Duties of School Commissioners and Superintendents." Edward Danforth, Troy, Chairman.

VI. "Physical Education and Military Drill in our Schools." W. N. Barringer, Troy, Chairman.

VII. "Curriculum of Studies for Common Schools." Prof. Cochran, Brooklyn, Chairman.

Lectures and Addresses.

I. "The Higher Education of Young Ladies." Rev. A. W. Cowles, D.D.

II. "The Nature and Uses of Logic." Prof. Charles Davies, LL.D.

III. "The Study of History." Hon. Andrew D. White, Michigan.

Many of the reports and addresses were carefully prepared, and gave rise to interesting discussion.

——The August (Second Annual) University Convocation of the State of New York is to be held in Albany. The objects of the Convocation, as declared at its organization, are mainly:

"To secure a better acquaintance among those engaged in the higher departments of instruction with each other and with the regents.

"To secure an interchange of opinions on the best methods of instruction in both colleges and academies, and as a consequence,

"To advance the standard of education throughout the State.

"To adopt such common rules as may seem best fitted to promote the harmonious workings of the State system of education.

"To consult and co-operate with the regents in devising and executing such plans of education as the advancing state of the population may demand."

The Convocation avow the expectation that they will exert a direct influence upon the people and Legislature of the State, personally and through the press, so as to secure such an appreciation of a thorough system of education, together with such pecuniary aid and legislative enactments as will place the institutions which it represents in a position worthy of the population and resources of the State.

——Frederic Hazen Fanning, Esq., in a communication to the MONTHLY, writes, that the Utica Female Academy, which was destroyed by incendiarism, in May, "is likely to be soon rebuilt. The school being a well-established and in every respect successful institution, has the hearty support of the citizens, who will soon enable it to recommence with suitable accommodations."

——In Syracuse, the children of the public schools are to be restricted to half-rations of mental diet. The number enrolled being in excess of the school accommodations, a part of the pupils are to attend in the morning; the remainder, in the afternoon.

CONNECTICUT.—The American Institute of Instruction will hold its Thirty-sixth annual meeting in New Haven, Conn., August 8, 9, 10, Rev. Birdsey G. Northrop, of Massachusetts, President. The following lectures are announced to be delivered: By ex-Gov. Emory Washburn, "Civil Polity as a Branch of Education;" by Wm. P. Atkinson, "Dynamic and Mechanic Teaching;" by T. D Woolsey, D.D., President of Yale College, "The Teaching of Moral and Political Duties in Public Schools;" by E. O. Haven, D.D., President of Michigan University, "The Indirect Benefits of School Education." It is expected that there will be discussions on the following subjects: "Methods of Teaching Latin to Beginners," "The Free-School System," "What Duties does the Return of Peace bring to the Friends of Education, particularly in Reference to the Freedmen of our Country?" "Methods of Presenting Moral Topics." Brief readings, by Prof. Mark Bailey, of Yale College, are announced for each day.

MASSACHUSETTS.—The Agent of the Board of Education makes a favorable report. "An increasing interest and progress," he says, "have been evinced, not only by the marked increase in appropriations, but by a better public sentiment, a more intelligent appreciation of schools; by the decline of the district system, and the consequent advancement in the gradation and classification of the schools; by the erection of improved, and in some cases costly, schoolhouses, and the introduction of better school furniture, in the face of war taxes and high prices; by the increase in the number of high schools, town libraries, and superintendents of schools; by the increased demand for graduates of our normal schools, the greater number of female teachers, and the consequent greater permanency of teachers, and

adoption of wiser and milder methods of school government; by the wider introduction of calisthenics and vocal gymnastics, and of object lessons and instruction in common things."

NEW HAMPSHIRE.—The Seventeenth Annual Report upon the Common Schools shows that an effort has been made to arouse the popular mind on the subject of education. It is not very creditable to the enterprise of the State that it has at so late a day begun the work contemplated. But that interest has been awakened is cause for gratification. The Board recommends the appointment of a State Superintendent of Schools, the establishment of a State Normal School, and of Teachers' Institutes.

PENNSYLVANIA.—One of the most elaborate and most satisfactory school documents we have seen for a long time, is the forty-sixth Annual Report of the Controllers of Public Schools of the First School District of Pennsylvania, comprising the city of Philadelphia. It is a well-printed octavo, of 328 pages, with fine woodcut views and diagrams of the principal schools. It embraces various subjects of interest respecting the schools, rules of the Board, by-laws and regulations, etc. The Report shows that the number of pupils in attendance at the beginning of the year 1865 was 74,343, an increase of 2,244 in one year. The expenditures for the year 1864 were $282,162, of which $21,585 seem to have been incurred by the erection of new school buildings. The annual cost of each pupil, as deduced from the tables given in the report, is $12.47. In Philadelphia, therefore, a child is educated at about two-thirds of the cost per pupil in Boston, and *at one-half of the cost per pupil in New York!*

——The National Teachers' Association will hold its annual meeting at Harrisburg, Pa., on the 15th, 16th, and 17th of August. Prof. S. S. Greene, President.

WEST VIRGINIA.—For various reasons, this new State is regarded with especial interest. From the first it has evinced a commendable regard for everything relating to popular instruction. The State Superintendent, Hon. W. R. White, is evidently indefatigable in his labors in behalf of the Free School system, and has succeeded in establishing important points. Teachers are by various means encouraged to perfect themselves in their profession, and stringent measures have been adopted to secure the profession from the intrusion of unworthy members, and to shield the public from the evils of incompetent teachers. In the Amended School Laws, good moral character is made the basis of requirements; diplomas and college-recommendations are of no avail, as a substitute for special examination. The grading of certificates is thus provided for:

"County superintendents shall grade the certificates granted according to the following scheme, numbering them according to the merits of the applicant from one to five. Number three shall be assumed as the medium between a very good and an indifferent teacher, so that the scheme will stand thus: Number one, a very good teacher—one accomplished in every respect; number two, a good teacher; number three, medium; number four, below medium; number five, indifferent. A number five certificate shall never be granted to any teacher more than once. If, upon a second examination, the applicant is not found entitled to a higher grade, no certificate shall be granted. A number four certificate shall not be granted more than twice in succession to the same applicant. If, at the third examination, the applicant is not found entitled to a higher grade, no certificate shall be granted. When any teacher has received three number one certificates, he shall be entitled to receive from the county superintendent a recommendation to the State superintendent for examination, and if found worthy, the State superintendent shall grant him a professional certificate."

Unless revoked, "for immorality or disloyalty," such a certificate is valid during the lifetime of the holder.

CALIFORNIA.—The enterprising character of this State is manifest in its educational aspects. Its official school reports are numerous and voluminous, and are not restricted to the English language,—the Spanish residents, particularly, have for a long time been enabled to learn their duty and privileges by elaborate documents in Spanish. The latest reports show that, under the present able superintendent, the educational interests of the State are receiving assiduous attention.

CURRENT PUBLICATIONS.

Among the annotated college text-books, of an enterprising Boston firm, are many really good publications. They are selected from the popular German, French, and Italian modern writers, and issued in a neat style of typography. We have particularly examined only the German annotated series, among which Andersen's Bilderbuch ohne

Bilder[1] and Tieck's Elfen and Rothkäppchen[2] strike us most favorably. The first of these is suitable for beginners; the other may be used as a second reader. A volume of select ballads, from the best German poets, with biographical sketches, introductions, arguments, grammatical and critical notes, in English, by the same professor, designed for advanced pupils, has been announced, and will soon be issued.

Edward Roth has dedicated a pleasant story[3] "to his pupils, old and young, of both hemispheres." The story was suggested by the sight of a well-known wonder of nature among the mountains of New England. The hero of the story is Pietro Casola, a native of Acqua Chiara, a small village in Italy. Early in life he exhibited a natural talent for the art of painting. In this he was encouraged by his mother, whose earnest desire was that her son should paint some great religious picture, which would benefit his fellow-men. She suggested, as a subject, Christ coming to judge the world. He entered a famous school of art in Italy, and there pursued the study of painting until he reached his twenty-third year, when he left for the purpose of commencing his promised work. He traveled through his native land, viewing many rare collections of art, but they all failed to assist him in portraying his grand idea. The death of his father called him home. He now touchingly related his many failures to his mother. She had learned from a dying traveler that, somewhere in the wilds of America, he might find a face in the rocks that would aid him in developing his great work. He determined to see it. And with his mother's blessing embarked for America. Here he fell in with a French hunter, who chanced to be a friend of the traveler whom his mother had befriended. He told this man his object in coming to America, and found that there was good ground for hope of success. Casola and the hunter, with four Indians, proceeded to search for this great wonder. After a long journey, with its hardships and pleasures, they at length found the spot described by the dying traveler. They were on the shores of a small lake, when the Indian leader stopped, and pointed to a rock on the mountains. One glance from Casola revealed the object of his longings. He returned to his native land, where he found his mother still living. He painted his great picture, and she had the happiness to enjoy it many years. The painting was hung in the village church, where every tenth year the installation of it is celebrated with great ceremony, and his grave richly decorated with loveliest flowers, brought by the fairest hands. The people to this day revere the artist and his great work.

The story is really very pleasant and interesting. The style is plain and simple, and the descriptions are so vivid that we can fairly see the party journeying amid the mountains of New England. So too of the celebrations, with the processions of youth, bearing flowers and garlands for the artist's tomb, in the Italian village. The story will prove useful to the young, by inciting a laudable ambition, and by teaching perseverance under difficulties.

No manual for students is more widely and favorably known than that of Dr. Todd,[4] which was first given to the public many years ago. New editions appear annually. In Europe it has been translated into many languages. It has been printed in various forms—unabridged, condensed, epitomized sometimes becoming a ponderous volume; sometimes shriveling to the dimensions of a pamphlet. In one sense, the work is of no importance; it might be regarded as a medley of historical and biographical facts and commonplace truisms. But, in another view, it is a work which has greatly influenced the habits and tastes of many who are now holding the pen of history, or uttering words of instruction. It will yet influence many who are to become the leaders of another generation. And its influence will be beneficial. Its facts are interesting: its advice, pertinent and in good spirit. The new revised edition is handsomely and accurately printed, and has the author's supplementary notes.

By the study of Etymology, it is possible to acquire such a practical knowledge of the signification of words, that a person may be able to determine the meaning of almost any word at sight. To accomplish such a result will not appear so difficult, when it is remembered that our language contains only about three hundred root-words, and that by prefixing *un* to these roots, or to the words derived from them by the use of other affixes, 5,600 new words may be formed; and 2,900 words by prefixing *in* and *im*; 2,400 by prefixing *co*, *con*, and *com*; 2,200 by the use of *re*; 1,800 by *di*; 1,750 by *e* and *ex*; 1,600 by *ad*, and 1,600 by *de*. Then 2,000 more words may be

(1) Bilderbuch ohne Bilder, von Hans Christian Anderson. 7th edition. With English notes, grammatical and miscellaneous, by Prof. L. Simonson, of Trinity College. Boston: De Vries, Ibarra & Co. 16mo. pp. 61.

(2) Die Elfen. Das Rothkäppchen. Von Ludwig Tieck. With English notes, etc., by Prof. L. Simonson. Imprint, supra. 16mo. pp. 78.

(3) Christus Judex. A Traveler's Tale. By Edward Roth. Philadelphia: Leypoldt. Price, $1.

(4) The Student's Manual; designed by specific directions, to aid in forming and strengthening the intellectual and moral character and habits of the Student. By Rev. John Todd, D.D., author of "Great Cities," etc. New revised edition. Northampton: Bridgman & Childs. Philadelphia: E. H. Butler & Co.

formed by annexing *ly* to other words; 1,900 by *ion;* 1,300 by *ness;* and 1,000 by *al.* Some idea may thus be formed of the extent to which one may acquire a ready knowledge of the meaning of words in our language, by learning their derivation, the signication of their roots, and of their several affixes from studying etymology.

A knowledge of the derivation of words is incidentally acquired by the study of Greek and Latin; but those who learn these languages seldom obtain, at the same time, a thorough knowledge of etymology. This subject requires a special study. Several works are used in schools to impart a knowledge of etymology, among which may be mentioned "Analysis of English Words," by Charles W. Sanders, A. M.; "The First Book of Etymology," by James Lynd, A. M., and Joseph Thomas, M. D., but no one has treated the subject so thoroughly as Prof. S. S. Haldeman, in his recent work.[5] While other works may be useful to beginners in the study of etymology, this work will be found useful to the college student, as well as to pupils whose studies of language have not been extended beyond their own vernacular.

Some of our educational journals reach us irregularly. The "Rhode Island Schoolmaster" makes us a regular monthly visit. The "Connecticut Common School Journal," edited by the distinguished author and teacher, Charles Northall, has reached its twentieth volume. The "Indiana School Journal" has been enlarged by the addition of sixteen pages, and will hereafter be published by John J. Parsons. One of the most sprightly of our exchanges is the "Illinois Teacher." It evinces a genial, healthy spirit, and, with short articles presenting a variety of subjects, is always a welcome guest. The "New York Teacher," established by the New York Teachers' Association, is one of the oldest of our State journals. It is still edited and published by James Cruikshank, whose labors in the cause of education have been recognized in the bestowal of a solid compliment, entitling him a doctor of laws. The students of Mount Pleasant Military Academy, at Sing Sing, of which Major W. W. Benjamin is superintendent, have assumed the publication of a monthly sheet, the "Mount Pleasant Reveille." It is issued regularly, and occasionally has some sprightly and sensible articles. Such a publication may be made interesting and profitable. We do not imply any ill will in wishing that it may have rivals in other schools.

The "Phrenological Journal" has completed its forty-first volume. The pioneer in its peculiar branch of science, it has for a long time done more for kindred studies than any other—it may almost be said, than all other periodicals. The July number has a biographical sketch of President Johnson, with portrait and phrenological analysis of character; a biography and portrait of Secretary Harlan; very handsome portraits of Victoria and Eugenie; a personal description of the conspirators on trial at Washington. The physiological department contains an article entitled Fat Folks and Lean Folks, which gives many interesting facts respecting the cause and cure of obesity and emaciation. Among the numerous brief articles are many of no little value, and we doubt not that the "Phrenological Journal" is at least as efficient an auxiliary to the cause of education as some of the technically educational journals.

"Barnard's American Journal of Education," for June, contains 1. Biographical Sketches of the Presidents of the American Institute of Instruction; 2. Pennsylvania State Normal School at Millersville; 3. Progressive Development of Physical Culture in the United States; 4. History of Various National Societies for the Advancement of Education; 5. History of the System of Common Schools in Connecticut; 6. Public Instruction in the Free Cities of Germany; 7. Public Instruction in the Duchy of Arnhalt; 8. Proceedings of the New York State Teachers' Association; 9. Hints to Young Students on Studies and the Conduct of Life, by Men Eminent in Literature and Business; 10. Chronological Catalogue of Educational Periodicals, from 1811–1864. This number has a portrait of the Rev. Samuel R. Hall. It announces that the number for September will be devoted exclusively to the proceedings of the several State Teachers' Associations, with biographical sketches of their presidents These sketches of more than eighty of the prominent teachers and promoters of educational improvement in the different States, will be accompanied by upwards of twenty portraits. In the list we notice the names of Davies, Woolworth, Sheldon, Hazeltine, and Stoddard, of New York; Edwards, of Illinois; Gregory, of Michigan; Peckham, of New Jersey; Andrews, of Ohio; Camp and Huntington, of Connecticut; Hagar, Parish, Stone, and Sheldon, of Massachusetts; Weston, of Maine; Coburn, Wickersham, Bates, and Allen, of Pennsylvania; McJilton, of Maryland, and other representative teachers of the different States.

(5) AFFIXES, IN THEIR ORIGIN AND APPLICATION, exhibiting the Etymological Structure of English Words. By S. S. Haldeman, A. M. Philadelphia: E. H. Butler & Co. 12mo., cloth, pp. 271.

SCIENCE AND THE ARTS.

——In the last number of the MONTHLY an allusion was made to the experiment by which starch sugar had been obtained in a hard, granular condition. To obtain this result the starch is first treated with sulphuric acid in the usual manner. The neutralized solution is then evaporated in a wooden vessel, allowed to rest and to solidify gradually. The mass of raw sugar is then removed and strongly pressed in a cloth, the syrup which is pressed out being reserved and boiled down in a fresh operation. After pressing, the sugar is melted and further concentrated in a water bath until the liquor reaches forty-three or forty-five degrees Baume. When this point is reached, the melted sugar is allowed to cool, with an occasional stirring. If it is desired to obtain the sugar in small granules, the stirring is continued. When this mass has cooled to twenty-five or thirty degrees, it is removed and dried in a gently heated drying-room.

——The fossil remains of the horse indicate that this animal inhabited the United States during the post-pleiocene period contemporarily with the mastodon, megalonyx, and the "broad-fronted" bison, and was not originally imported into America from the East, as generally supposed.

——Experiments indicate that paint on surfaces exposed to the sun will be much more durable if applied in autumn or spring, than if put on during hot weather. In cold weather it dries slowly, forms a hard, glossy coat, tough like glass; applied in warm weather, the oil strikes into the wood, leaving the paint so dry that it is rapidly beaten off by rains.

——Coal put into bins and leveled can be measured, from one to a thousand tuns, with as much accuracy as it can be weighed on scales. For instance, Lehigh white-ash coal per tun of 2,000 pounds, of the egg or stove size, will uniformly measure 34½ feet cubical, white-ash Schuylkill coal will measure 35, and the pink gray and red-ash will reach 36 cubical feet per tun of 2,000 pounds, or 40 feet for 2,240 pounds, the difference of cubical contents between the net and gross tun being exactly 4 feet. If the length, breadth, and height of the bin be multiplied together, and the product divided by the aforesaid contents of a tun, the quotient must show the number of tuns therein.

——The proper mode of introducing the desirable French system will be for Congress to pass a law making it the legal system at the end of five or ten years; so as to give the several States an opportunity to have it thoroughly taught in the public schools.

——A new system of locomotives has been invented in France, so constructed as to surmount considerable declivities and to describe curves of a small radius. These engines have four cylinders and six axles, divided into two groups of three each, moved by the pistons of one pair of cylinders. The wheels are so small that the fireplace of the boiler extends beyond them, so that the fire requires an unusually large surface. To facilitate the describing of small curves, a little play is left between the flanges of the wheels which keep the train between the rails, and the axles have some play in their sockets.

——In the alluvial basin of the river La Plata have recently been discovered a quantity of fossil bones, many of which have been deposited in the Museum of Buenos Ayres. Among these are the thigh bones of the Megatherium, of a much larger size than ever seen before; large horses' heads with curved teeth, and a whole skeleton of the Glyptodon, a gigantic animal of the order Edentata, that is, having no teeth in the front of the jaws. This Glyptodon is nearly nine feet long by five feet in height.

——It has been recently discovered that sulphate of copper is an excellent preservative for wood. Pieces of wood of moderate dimensions may be preserved by letting them soak for eight or ten days in a solution of five kilograms of sulphate in ten liters of water. At the Garden of Plants, a solution of two kilograms of sulphate in one hundred liters of water is found very useful in preserving the mats with which the hothouses are covered.

——A new method of concentrating the mineral waters of Saratoga has been proposed—that of freezing. A portion of the water will be frozen, and the remainder, containing all the mineral substances, will then be boiled. The water should be gently agitated during the process of freezing, when the frozen portion will collect in the form of a milky snow.

——M. Giffard, of Paris, has succeeded in constructing a steam-engine for aerial navigation, whose weight bears a very small proportion to that of ordinary engines of equal power. The first model, constructed under his superintendence, has been worked with success at a pressure of nine hundred pounds to the square inch, and he is sanguine that he will soon be able to increase the pressure to three thousand pounds. This engine, placed in the car, will drive a propelling screw, furnished with very large vanes, which in calm weather will send the balloon through the air at the rate of thirty

miles an hour. The car will hold three days' supply of coal and water. By means of a condenser, the same water can be used over and over again. The balloon will be made of two thicknesses of muslin, with an intervening thickness of India-rubber.

——The triangulations of Central Europe have been commenced in Austrian territory. The first point of the first order is situated on the height of Doblitz, near Prague. The longitude of Doblitz was determined by an electrical connection with Leipzig.

——Permission to work a French patent for the manufacture of brandy from coal gas has recently been purchased for a large sum by an English company, and the work is to be started in London.

——A successful experiment was lately made in Paris for the preservation of grain from fermentation and the attacks of insects, by inclosing it in a metal vessel and exhausting the air. Ten hectoliters of wheat were placed in a metal vessel, and the air was exhausted. The vessel was opened after fifteen days, and the weevils, which were seen quite lively when the wheat was placed in the vessel, had quitted their cells and were dead. They were warmed, but did not stir. Placed on white paper, they were reduced to powder, without leaving any stain on the paper. Experiments on wheat under glass, prove that the weevil retains life longer than any other insect when deprived of air.

——A lamp has been invented by which photographers can employ the hours after sunset in multiplying negative copies from positive pictures taken during the day. Light is obtained from two streams of oxygen, one pure, the other saturated with ether, or some spirit rich in hydrogen, the jet of flame impinging on a cylinder of lime.

——Water moves miles horizontally, while it moves only a few feet vertically. If the earth were covered with an ocean of uniform depth, the tides could be easily calculated in a mathematical way, but the irregularity of the depths of the sea, and the shapes of the continents, make it complicated. Investigators would do well to devise some means of recording horizontally, as well as vertically, the motion of the water. The tides are one and a half to two days old, according to the coast. At Bombay they are one and a half days old; that is, the semi-diurnal tide. But the diurnal tide is not more than a few hours old. Tides of a longer period are much more accelerated by friction than tides of a shorter period.

——For the health of passengers, paddle-steamers are found to be superior to screws, as it regards oscillation; but the atmosphere in screw-steamers is rather better, the engine being apart from the rest of the vessel. Nautical diseases have in a great measure lost their virulence, on account of the short time in which passages in steam vessels are effected. The frequent renewal of air caused by steam is, to a certain extent, a preservative against maladies peculiar to hot climates.

——The main wheel of an American watch makes 4 revolutions in 24 hours, or 1,460 in a year; the second or center wheel, 24 revolutions in 24 hours, or 8,760 in a year; the third wheel, 192 in 24 hours, or 69,080 in a year; the fourth wheel (which carries the second-hand), 1,440 in 24 hours, or 525,600 in a year; the fifth, or 'scape wheel, 12,960 in 24 hours, or 4,728,400 revolutions in a year; while the beats or vibrations made in 24 hours are 388,800, or 141,812,000 in a year.

——A new pigment, calculated at the same time to increase the resources of the decorative painter, and to afford a ready means of preserving iron and other metals, has recently been introduced at Paris by M. L. Oudry. He first obtains a pure copper by throwing down the metal by the galvanic process; then reduces the precipitate to an impalpable powder by stamping. This powder is then combined with a particular preparation of benzine, and used in the same way as ordinary paint. Beautiful bronzed effects are produced upon it by means of dressing with acidified solutions and pure copper powder. The articles painted with the new material have all the appearance of electro-bronze; its cost is less than one-sixth; it will last from eight to ten years. Mr. Oudry also proposes to substitute benzine oil for linseed and other oils.

MISCELLANY.

——Mrs. L. H. Sigourney, whose death at an advanced age is announced, was perhaps more widely known and universally respected than any other American poetess. She was born in Norwich, Conn., September 1, 1791, and in 1825 published her first volume of poems. Her maiden name was Huntley, and she was married to Mr. Chas. Sigourney, a wealthy Hartford gentleman, when she was twenty-eight. Previous to

that time she had taught school. Since then, though rearing a family of children, she found time to produce nearly fifty volumes. Her prose is marked by vigor, beauty, and good sense, and, like her poetry, is full of good moral precepts. Her poetry belongs to the school in which we look for such names as those of Dr Beattie, Hannah More, Mrs. Barbauld, and Dr. Watts.

——The Trenton *Monitor*, speaking of a contributor to the comic paper called *Mrs. Grundy*, quotes the Troy *Times* as to his talents that way: "To us a village cemetery at the soft and pensive hour of twilight, is wild hilarity compared to the humorous writings of Mr. Thomas Dunn English!"

——One of the novel features of the war just brought to a close, has been the use of the magnetic telegraph for military purposes. At the commencement of the present fiscal year, there were in operation 6,500 miles of military telegraph, of which 76 miles were submarine—of this 3,000 miles, including 38 miles of submarine telegraph, has been constructed since the war broke out. One million eight hundred thousand telegraphic messages were transmitted during the year, at an average cost of about thirty cents.

——Several years ago a peasant lad, about ten years of age, in the neighborhood of Campen, when sent to mind his father's cow, would tie her to a tree, pass the whole day in drawing her in different positions, and take her home at night almost starved. M. de Keyser, Director of the Royal Academy of Antwerp, secured him the advantage of a regular course of instruction. Seven years have passed since this epoch, and the little peasant, whose name is Charles Ooms, has just obtained the Antwerp Academy's first prize for his paintings.

——Mrs. Lincoln has presented to Mr. Williamson, her boy's late tutor, the shawl worn by Mr. Lincoln in his perilous journey to Washington in 1861.

——Spurgeon, in a charity sermon, related a joke about a poor minister who required cash, and was met by the remark, "I always thought you preached for souls, not money?" The minister replied: "So I do, but I can't live on souls, and if I could, it would take a great many like yours to make me a breakfast."

——Thomas Hood, the son of the famous humorist, has become the editor of *Fun*, the weekly paper published in London as a rival to *Punch*.

——There is a woman in Quebec 113 years old. Her children, grandchildren, and great-grandchildren, number 226.

——A play, entitled "Abraham Lincoln; or, the Civil War in America," is on the boards of a Vienna theatre.

——An old waiter, having got a prize in a lottery, retired into private life; but it is related of him, as a fact, that he could never hear a bell ring without crying out, "Coming, sir." Such is the force of habit.

——A number of peasants, on resuming work in the fields, after their mid-day repast, lately, missed one of their comrades, and on looking about found him struggling in the agonies of suffocation caused by a large snake, commonly called the *smiroed* (coluber milo), which had partially introduced itself into his mouth while he was asleep on the ground. About one-third of the snake's body was in his mouth and throat, and the rest coiled tightly round his neck. He died before the viper could be extracted.

——The father of Grace Darling died recently at Banburgh, England, in his 80th year. He some years ago resigned his position as keeper of the Lapstone Lighthouse, where occurred the celebrated shipwreck scene in which Grace Darling conferred such luster upon her sex. Grace died of consumption in 1842, aged 27.

——At a meeting of the New York Historical Society, Gen. Cochrane read a paper "showing that the waters between Staten Island and New Jersey, viz., the Kills, the Sound, and Raritan Bay, are not nor ever were New Jersey waters, but always have been and are parts of the Hudson River and the waters of New York."

——When Maurice Margaret was tried at Edinburg for sedition, the Lord Justice asked him, "Hae you ony counsel, mon?" "No." "Do you want to hae ony appointed?" "I only want an interpreter, to make me understand what your lordship says," he replied.

——A man of genius can no more divest himself of freedom of opinion than of the features of his face.

——Flies seem to be exempt from any of the pains and penalties that generally await intruders and interlopers. They go about their own business, and that occupation consists principally in meddling with the urgent business of humanity, lighting upon his nose, making tracks over a bald pate (if he has one), getting in the coffee cup, getting submerged in the butter; and doing a great many other things that flies ought to be ashamed of in their quiet moments. We are fond of flies; we may say that we admire them—in their proper place—but we shall insist on having them served upon a separate dish, or not at all. We like the buzz of applause, and the buzz of fame, but the buzz of a fly is our detestation. Recommend us to our friends, but save us from a fly, especially the family fly, that is a host in itself. Kill one, and a brigade reinforces the deceased. We hate flies generally, and the brevity of this article is owing to their repeated and frequent assaults.